

AN ANALYSIS OF GROUP VIII TRAINING

Vernie Richard Coston

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# NAVAL POSTGRADUATE SCHOOL

## Monterey, California



# THESIS

AN ANALYSIS OF GROUP VIII TRAINING

by

Vernie Richard Coston  
and  
Bruce Lawellin Jackson

June 1976

Thesis Advisor: Jonathan C. Tibbitts, Jr.

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by

Vernie Richard Coston  
Lieutenant Commander, Civil Engineer Corps, U.S.N.  
B. S., North Carolina State College, 1960

Bruce Lawellin Jackson  
Lieutenant Commander, Civil Engineer Corps, U.S.N.  
B. S., University of Kansas, 1960

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requirements for the degree of

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from the

NAVAL POSTGRADUATE SCHOOL  
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## ABSTRACT

This paper analyzes and compares the methods by which training requirements for SEABEES (Group VIII ratings) are determined and training resources allocated. The major observation is that two different strategies exist. CNO (OP-099) tends to be concerned with the numbers of personnel on-board and the anticipated gains and losses, whereas CINCPACFLT and CINCLANTFLT view the problem in the near time frame, being concerned with deficiencies which may degrade SEABEE readiness. The approach taken is to first provide background data on the structure of the Group VIII ratings, the manner in which these personnel are employed, and the existing systems for managing their training. Training responsibilities are identified, and problems which exist in the current systems are presented. The analysis emphasizes environmental, cost, efficiency and management control factors.



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## I. INTRODUCTION

The basic problem identified in this study is that two different strategies exist for the allocation of training resources in the Navy's Group VIII ratings. They are; (1) OP-099 tends to view SEABEE training from a broad viewpoint, giving principal weight to such variables as the numbers of on-board personnel, accessions, and attrition, and (2), the Fleets (CINCPACFLT and CINCLANTFLT) tend to appraise the training problem from a different perspective, being principally concerned with skill deficiencies that may impact on the unit's ability to perform its assigned mission.

As a result of these differing viewpoints, two separate training systems have evolved. This has led to a situation where training plans and programs of the Fleets and OP-099 are each developed on a more or less unilateral basis. Within the recent past, there has been a concerted effort to coordinate the training programs through improved communication and cooperation, yet the maximum benefit possible from these efforts is frustrated by a lack of a common denominator for stating training requirements, goals, and objectives.

The Navy is currently in a period of decreasing budgets and programs in all areas are being considered for reduction. Programs which cannot be justified based on firm and defensible requirements are likely candidates for reduction or elimination. Group VIII formal training programs are being critically reviewed, particularly -School. These schools are vulnerable because requirements



can presently be expressed only in subjective terms. There is a danger of making vertical cuts which will eliminate essential elements of training.

The units in the Naval Construction Force (NCF) provide training to their personnel through fleet and formal training. Fleet training is usually designed to maintain or improve skills already learned, to prepare personnel for changing mission requirements, for contingency needs, or for specific skill areas needed to accomplish upcoming construction projects. As funding support for various formal training programs diminishes, Fleet training needs are increased because personnel become less proficient. This leads the NCF community to increase Special SEABEE Training courses (SCBT), crew training, factory and other training to improve overall skill levels. The problem is that accomplishing of occupational training through Fleet resources may possibly not be the most efficient means to do so, and may, in fact detract from other operational objectives. A second problem is that training received through SCBT is sometimes duplicated when the individual attends the formal schools because SCBT courses are, in most cases, derived directly from formal courses. The training programs can be streamlined if this duplication can be identified and eliminated.

A single management control system that will serve the needs of both the Fleets and the formal training commands is needed. The system should account for skill inventory levels and permit projecting of training requirements based on known budget constraints, anticipated changes to the Naval Construction Force, requirements of upcoming deployments, and changing contingency demands.



## II. BACKGROUND

Prior to undertaking a detailed analysis of the Group VIII training programs, the environment in which these systems operate should be discussed. This chapter describes the Group VIII ratings and the way in which they are employed, reviews the overall training structure for the SEABEES and the Navy as a whole, and investigates the parameters within which the Group VIII training system must exist.

### A. THE NAVY ENLISTED OCCUPATIONAL GROUPS

Within the Navy, enlisted personnel resources and enlisted personnel requirements are identified primarily in terms of broad occupational skill categories, termed ratings. A rating defines an enlisted career field which requires similar aptitudes, knowledge, and training. Collectively, the individual ratings form the Navy enlisted rating structure, which is the fundamental tool for the management of enlisted personnel resources. In general, Navy enlisted personnel are advanced in grade, trained, and distributed by rating. In order to manage the 67 general ratings in the Navy Occupational Structure, the ratings have been grouped for management and control purposes into 11 rating groups as shown in Table I. While this study is limited to the Group VIII or Construction Group, it should be noted that the Naval Mobile Construction Battalion, (NMCB), has a personnel allowance which includes other ratings as well. Since roughly 85% of the NMCB allowance is





from the Group VIII community, the majority of the training program concerns these personnel.



TABLE INAVY OCCUPATIONAL GROUPS

| <u>GROUP</u>              | <u>RATINGS INCLUDED</u>  |
|---------------------------|--|
| I, Deck Group             | BM, QM, SM, OS, ST, EW, OT<br>MA   |
| II, Ordinance Group       | TM, MN, GM, MT, FT   |
| III, Electronics Group    | ET, DS   |
| IV, Precision Instrument  | IM, OM, PI   |
| V, Admin and Clerical     | RM, CT, YN, PC, PN, JO, DP<br>SK, SH, DK, LN, NC, MS, IS                           |
| VI, Miscellaneous Group   | LI, DM, MU   |
| VII, Engineering and Hull | MM, EN, MR, BT, BR, EM, IC<br>PM, ML, HT, GS                                       |
| VIII, Construction        | EA, BU, SW, CE, UT, CM, EO   |
| IX, Aviation              | AV, AF, AD, AT, AX, AW, AO<br>AQ, AC, AB, AE, AM, PR, AG<br>TD, AK, AZ, AS, PH, PT |
| X, Medical Group          | HM   |
| XI, Dental Group          | DT   |

Source: Department of the Navy, Navy Military  
Personnel Statistics, NAVPERS 15658, 30 September,  
1973



## B. THE GROUP VIII, (CONSTRUCTION), RATINGS

The Group VIII ratings of the Navy are made up of the seven skill areas required for the construction mission of the Naval Construction Force. Essentially, the personnel who possess these ratings must be able to perform at a level comparable with their civilian counterpart of apprentice, journeyman, etc. The numbers of individuals in each of the ratings will vary with the overall Navy strength level. Table II is a compilation of personnel strength by rate and rating for the Group VIII personnel. A brief description of the Group VIII ratings follows:

Builder, (BU): Builders construct, maintain, and repair all types of wood and concrete structures. In addition, they perform such auxiliary functions as shoring, underpinning, pile jettying, and capping. They operate sawmills, carpenter and cabinetmaking shops, and mix and place concrete in all types of structures including underwater installations.

Construction Electrician, (CE): Construction Electricians install, operate, maintain and repair electrical generating equipment, distribution systems, transformers, switchboards, distribution panels, motors, inside wiring, and lighting fixtures. They erect and maintain power and communication lines, and install, operate, maintain, and repair communication equipment.

Construction Mechanic, (CM): Construction Mechanics maintain, lubricate, repair, and overhaul automotive and heavy construction equipment and diesel and gasoline internal-combustion engines to insure efficient mechanical operation. They operate the various types of garage



equipment for moving and testing automotive machinery.

Engineering Aid, (EA): Engineering Aids duties include making reconnaissance, preliminary and final location surveys for roads, airfields, pipelines, ditches, buildings, drainage structures, and waterfront construction. Engineering Aids adjust, clean and maintain levels, transits, alidades, and other equipment. Their duties include making hydrographic, topographic, and triangulation surveys, maps, and profiles. They compute the amount of material to be moved in cuts and fills and lay out all types of construction work.

Equipment Operator, (EO): Equipment Operators dispatch, operate, fieldcheck, and service automotive and heavy construction equipment such as buses, trucks, tractors, shovels, cranes, scrapers, pile drivers, ditchers, rollers and graders. They rig cable assemblies and change attachments (blades, backhoes, clamshell buckets) to adapt construction equipment to various types of operations such as heavy digging, scraping, pushing, or pulling.

Steelworker, (SW): Steelworkers rig and operate all the special equipment used to move or hoist structural steel, structural shapes, and similar materials. Steelworkers erect or dismantle steel bridges, piers, buildings, tanks, towers, and other structures. They place, fit, weld, cut, bolt and rivet steel shapes, plates, and built-up sections used in the construction of advance-base facilities.

Utilitiesman, (UT): Utilitiesmen maintain and repair boilers, evaporators, and related equipment for the distillation and purification of water. They maintain and repair boilers, pumps, condensers, engines, and perform the plumbing and pipe-fitting work required in the maintenance of this equipment. They make chemical tests to determine the safeness of water, and maintain and operate water supply and sewage disposal plants or installations.





TABLE II  
GROUP VIII MANNING STATUS AS OF 31 JULY, 1975  
(LESS E-5 AND NON-DESIGNATED STRIKERS)

| <u>ALLOWANCE</u> |              |            |            |            |              |              |
|------------------|--------------|------------|------------|------------|--------------|--------------|
| <u>Rating</u>    | <u>E-7/8</u> | <u>E-6</u> | <u>E-5</u> | <u>E-4</u> | <u>E-1/3</u> | <u>Total</u> |
| EA               | 35           | 69         | 85         | 68         | 26           | 283          |
| CE               | 127          | 250        | 395        | 295        | 108          | 1175         |
| EO               | 179          | 377        | 434        | 488        | 242          | 1720         |
| CM               | 129          | 279        | 349        | 318        | 148          | 1223         |
| BU               | 261          | 440        | 593        | 599        | 302          | 2159         |
| SW               | 104          | 169        | 157        | 199        | 89           | 718          |
| UT               | 114          | 229        | 338        | 277        | 103          | 1061         |
| Total            | 949          | 1813       | 2351       | 2244       | 1018         | 8375         |

| <u>ON-BOARD</u> |      |      |      |      |      |       |
|-----------------|------|------|------|------|------|-------|
| EA              | 32   | 74   | 123  | 128  | 123  | 480   |
| CE              | 134  | 245  | 406  | 376  | 411  | 1572  |
| EO              | 194  | 360  | 504  | 544  | 971  | 2573  |
| CM              | 139  | 266  | 379  | 348  | 424  | 1554  |
| BU              | 252  | 431  | 573  | 749  | 943  | 2948  |
| SW              | 116  | 169  | 157  | 191  | 239  | 872   |
| UT              | 137  | 217  | 315  | 338  | 498  | 1505  |
| Total           | 1004 | 1762 | 2455 | 2674 | 3609 | 11504 |

Source: PRCP Group VIII Strength and Allowance Report, 31 July 1975.



## ASSIGNMENT OF GROUP VIII PERSONNEL

Personnel in the construction ratings may be assigned to a wide variety of units in the Naval establishment. The types of shore duty available include staff duty at one of the NCF related staffs, public works related duty as a member of one of the Construction Battalion Units, and other such billets. Sea duty is most frequently encountered as a member of one of the Naval Mobile Construction Battalions or the Amphibious Construction Battalions:

### 1. Active Naval Construction Force

The term Naval Construction Force, (NCF), is used to describe the commands, regiments, battalions, units, and teams which are under the administrative control of the Commander, Naval Construction Battalions, Pacific Fleet, (COMCBPAC), and the Commander Naval Construction Battalions, Atlantic Fleet, (COMCBLANT). These include:

#### a. Naval Mobile Construction Battalions

The NMCB is the major recipient of Group VIII personnel. As the primary operational unit of the Naval Construction Force, the NMCB's are charged with the responsibility to maintain a state of readiness adequate to respond to a wide variety of contingency missions in support of U.S. and friendly forces, [Ref. 1]. In addition, the NMCB's have a peacetime mission requiring them to maintain critical construction skills by constructing Fleet support facilities throughout the world. NMCB's are commissioned



units under the operational control of the Commander-in-Chief, U.S. Pacific Fleet, and the Commander-in-Chief, U.S. Atlantic Fleet. This operational control is exercised through COMCBPAC and COMCBLANT. At the height of the RVN conflict, the Naval Construction Force had 22 active NMCB's manned at more than 1000 men each. In FY-1976, the number of active NMCB's is authorized at 8, manned at 563 Enlisted and 22 Officers each.

#### b. Naval Construction Regiments

The NCR is a headquarters command and control organization with the mission to coordinate and control the operations of 2 or more NMCB's in a theater of operations. At present, the Thirtieth Naval Construction Regiment, homeported on Guam, is the only remaining operational regiment in the active NCF. However, two training regiments exist, one at Port Hueneme, California and the other at Gulfport, Mississippi, the homeports of the Pacific and Atlantic NMCB's. These regiments provide support and assistance to the NMCB's at homeport and project material procurement and equipment management for deployed battalions.

#### c. SFABEE Teams

SFABEE Teams are specialized and highly trained 3-man civic action teams which are derived from NMCB resources, trained as units, and deployed to remote areas of the Trust Territories of the Pacific Ocean.

#### d. Underwater Construction Teams



The Underwater Construction Teams are operational Fleet units trained in the normal Group VIII rating skills and capable of operating in the underwater environment as well. The members of the UCT are qualified Navy divers. UCT's provide underwater construction support to the Navy wherever this specialized talent is needed.

## 2. Other Organized Units

In addition to the units within the Naval Construction Force described above, there are three additional types of SEABEE units which should be included in any analysis of training for Group VIII ratings. The following are numbered Fleet or shore based units of the Navy, and have a high percentage of Group VIII personnel.

### a. CBMU 302

Construction Battalion Maintenance Unit 302, located at Subic Bay, Republic of the Phillipines, is the only active unit of this type. Its contingency mission is to provide public works and public utilities support at advanced bases. During peacetime, it is involved with back-up support for public works centers and public works departments at overseas commands.

### b. Construction Battalion Units

CBU's are small shore-based units located at major Naval installations throughout the United States. The mission of these units is to provide self help support to the Navy. Personnel are assigned to these units for a normal tour of shore duty. Since these units do not deploy,





training is normally done in connection with permanent change of station orders, where the individual is ordered to a Naval Construction Training Center, (NCTC), prior to reporting to the ultimate duty station. A listing of the CBU's is provided in Table III.

### c. Amphibious Construction Battalions

ACB's are Fleet units under the operational control of the Amphibious Commanders of the Atlantic and Pacific Fleets. The two ACB's are smaller in size than MCB's and contain a smaller percentage of Group VIII ratings. The mission of the ACB is to provide inshore construction support to the amphibious force during an amphibious assault.

### 3. Shore Stations

Group VIII personnel are assigned to Continental United States, (CONUS) and overseas shore duty in a variety of billets. They are usually assigned to billets which utilize their occupational rating skills.

### 4. Reserve Naval Construction Force

The term Reserve Naval Construction Force describes the collective commands and units under the command of the First Reserve Naval Construction Brigade, (CCMFIRSTRESNAVCONSTBRIGADE). This force consists of 17 Reserve NMCE's, 8 Reserve NCR's, and the brigade headquarters staff. Upon mobilization, these units are capable of deploying with a minimum amount of readiness training. These units conduct annual active duty for



training as organized units, frequently at one of the Naval Construction Battalion Centers.



TABLE III  
CONSTRUCTION BATTALION UNITS

| <u>Unit</u> | <u>Location</u>                          |
|-------------|--|
| 401         | Naval Training Center, Great Lakes, Ill. |
| 402         | Naval Air Station, Pensacola, Fla.       |
| 403         | Naval Academy, Annapolis, Md.            |
| 404         | Naval Air Station, Memphis, Tenn.        |
| 405         | Naval Station, San Diego, Cal.           |
| 406         | Naval Air Station, Lemoore, Cal.         |
| 407         | Naval Air Station, Corpus Christi, Tex.  |
| 410         | Naval Air Station, Jacksonville, Fla.    |
| 411         | Naval Station, Norfolk, Va.              |
| 412         | Naval Station, Charleston, S.C.          |
| 413         | Naval Station, Pearl Harbor, Hi.         |
| 414         | Naval Submarine Base, New London, Conn.  |
| 415         | Naval Air Station, Oceana, Va.           |
| 416         | Naval Station, Alameda, Cal.             |
| 417         | Naval Air Station, Whidbey Island, Wa.   |

Source: Department of the Navy, Naval Facilities  
Engineering Command, Civil Engineer Corps  
Directory, NAVFAC P-1, Summer, 1975.



## D. SKILL MANAGEMENT SYSTEMS

The Navy rating structure is supplemented by the Navy Enlisted Classification, (NEC), coding system, the Personnel Qualifications Standards, (PQS), and the Personnel Readiness Capabilities Program, (PRCP). Each of these programs or systems attempts to identify skills in specific terms such that they can be accounted for through an inventory management process.

### 1. Navy Enlisted Classification System

The NEC with its respective code provides more specific identification of technical skills within the scope of the ratings. An NEC is a four-digit identifier assigned to both enlisted personnel and enlisted billets. When assigned to personnel of a rating, it identifies special skills or training beyond that generally associated with the rating. When assigned to a billet, the NEC identifies a special requirement of that job. In many cases, in order to become qualified to fill a billet with an NEC requirement, a man must attend a formal course of instruction, [Ref's 2 and 3].

### 2. Personnel Qualification Standards

Personnel Qualification Standards (PQS) are a written compilation of knowledge and skills derived from task analysis and required to qualify personnel for a specific watch, station, or to perform as a team member within an assigned unit, [Ref. 4]. The PQS has been





designed as a qualifications guide for trainees together with a record of individual progress and certification. PQS is designed specifically to assist in watchstander qualification of personnel in highly complex shipboard systems. In most cases, it is operator oriented. PQS has not been implemented within the NCF because PRCP accomplishes basically the same purpose and is currently fully operational.

### 3. PRCP

The Personnel Readiness Capabilities Program, (PRCP), is an operational computer-based system which identifies Mobile Construction Battalion skill requirements and maintains a current inventory of the skills within the MCB's, [Ref. 5]. In the PRCP, skills common to each rating have been defined in a set of Manuals called Interviewer's Standards and Guides, [Ref. 6]. These skills are given an identification number and a descriptive title and are defined according to skill level 1, 2, or 3, where level 1 is the lowest and level 3 the highest degree of proficiency in a particular skill. For example, Builder skill 140, level 1 can be acquired either through on-the-job training, completion of a special SEABEE training course, or through A-School. An individual with skill 140, level 3 must have completed C-School and hold NEC BU-5902, Masonry technician. Some PRCP skills have only one skill level, others have two or three levels.

CCMCEPAC and COMCBLANT have promulgated Reference 7, which sets forth the specific skills which each NMCB should possess. These skill requirements, identified by descriptive title, PRCP skill identification, and NEC Code, are shown in Appendix B. The number of skills, skill levels, and training requirements specified in the



Instruction reflect the Fleet commands best estimate of the skills that will be necessary for NMCB operations in contingency situations.

Based on the inventory and requirements data developed from the material thus generated, the PRCP reporting system provides continually updated reports on a unit's readiness condition. The overall system includes; (1) A comprehensive statement of skill requirements, (2) An accurate inventory of existing skills, and (3) An automated data processing capability to process the data. Each individual NMCB prepares PRCP transcript masters for each member of the unit, which are forwarded to the computer facilities at Port Hueneme and converted to sequentially filed data banks from which punch cards are prepared and returned to the unit. The unit then can use its keysort capability to retrieve data for its own use.

The Civil Engineering Support Office (CESO), located at the Naval Construction Battalion Center, Port Hueneme, is responsible for the technical aspects of the PRCP. The data processing facility at CESO is used to combine data from the unit with data from the BUPERS master tape to generate several reports of use to SEABEE planners. Sample pages from the PRCP Skill Strength Report, NEC Strength Allowance report, and NEC Exception Reports are shown in Figures 1, 2, and 3. The formats for these reports are as follows:



a. FRCP Skill Strength Report

| <u>Line</u> | <u>Line Description</u>  |
|-------------|--|
| 1           | Report heading and date  |
| 2 / 3       | Facilities Support Office (FACSO)<br>Report/Symbol number, report title, GEMS<br>report number, and page number. |
| 4           | Activity or Unit.  |
| 5 / 6       | Column Headings.   |
| 7           | Skill Title.   |
| 8           | Level three skills.  |
| 9           | Level two skills.  |
| 10          | Level one skills.  |
| 11          | Total skills.  |
| 7 - 12      | Repeated as applicable to complete page.   |



| <u>Column</u> | <u>Column Description</u>   |
|---------------|---|
| 1             | SKILL LEVEL (PRCP skill level).   |
| 2             | STD REQ (Standard Requirement). The standard requirement is based on a percentage of on-board personnel in the individual rating groups. Percentages used to determine the standard requirements are contained in Ref. 7.   |
| 3             | MIN REQ (Minimum Requirement). The minimum requirements are stated in Ref. 7.   |
| 4             | PROJ REQ (Project Requirement). This column is for use by the unit to indicate a deployment project or special project req't which exceeds the standard requirement for the skill.  |
| 5             | COB. Current on-board as of the date of the report. This column is sub-divided into two sections; BASE and OTH (other). For the Group VIII rating sections of the report, counts for the individual Group VIII rating skills, except E9, appear under the BASE column and the skills of other ratings, including E-9, appear under OTH.                         |
| 6             | POB 3. Projected on-board three months from date of report.   |
| 7             | POB 6. Projected on-board six months from the date of the report.   |
| 8             | POB 9. Projected on-board nine months from date of report.  |
| 9             | POB 12. Projected on-board twelve months from date of report.   |
| 0 / 11        | COMPARISON STD TO POB 6. The number of excesses or shortages for each skill qualification projected to be on-board six months from the date of the report is compared with the standard requirement according to Ref. 7. The percentage of skill qualifications for personnel projected to be on-board with respect to standard requirements is also displayed. |
| 2 / 13        | COMPARISON PROJ TO POB 6. The same information as above except the projected on-board count is compared with a PROJECT requirement. In the event a deployment or special project requires skills beyond the standard req't, the unit can enter the project requirement and this column will be displayed.   |





b. NEC Strength and Allowance Report.

Line Descriptions

line 1 Report title and date.

line 2. FACSO report symbol, GEMS report no.  
and page number.

line 3. Activity or Unit.

lines 4/5 Column Headings.

line 6 NEC Code Number and NEC Allowance  
according to OPNAV approved manpower  
authorization.

s Req'd Listing of personnel possessing the NEC

lines following above: RATING TOTALS. Summary by rating of  
personnel possessing the NEC, the Req'm't,  
and the OPNAV approved allowance.  
Column headings for this section appear across  
the bottom of the page.



Upper Column Headings

| <u>column</u> | <u>Column Description</u>  |
|---------------|--|
| 1             | NAME. Name of individual holding NEC.  |
| 2             | SSN. Social Security Number.   |
| 3             | RATE. Rating abbreviation.   |
| 4             | DISTR RATE. Distribution rate.   |
| 5             | PNEC. Primary Navy Enlisted Classification Code.   |
| 6             | SNEC. Secondary Navy Enlisted Classification Code.   |
| 7             | NEC3. Tertiary Navy Enlisted Classification Code.  |
| 8             | BRCL. Branch and class of service code.  |
| 9             | EAOS YRMO. Year and month of expiration of active obligated service.   |
| 10            | EXT OTH. Extension of enlistment month.  |
| 11            | EXT SCH. Number of months extension of enlistment for school.  |
| 12            | PRD YRMO. Year and month of prospective rotation date.   |
| 13            | EDA/L YRMO. Estimated date (year and month) that the individual will arrive or leave the command. EDA or EDL is indicated by suffix of A or L. |



Lower Column Headings

| <u>Column</u> | <u>Column Description</u>  |
|---------------|--|
| 1             | RATE. Rate and Rating.   |
| 2             | 1500 INST REQT. Total number established as requirement in Ref. 7.               |
| 3             | ALLOW. Allowance reflected in approved manpower authorization.                   |
| 4             | COB. Current on-board.   |
| 5 - 16        | POB1 through POB12. Projected on-board one to twelve months from date of report. |

c. NEC Exception Report

| <u>Line</u> | <u>Line Description</u>                                  |
|-------------|--|
| 1           | Report Title and date.                                   |
| 2           | FACSO report symbol, GEMS report number and page number. |
| 3           | Activity title and report subtitle.                      |
| 4           | Column headings.   |
| etc.        | Listing of NEC's with 75 percent or less attainment      |

| <u>Column</u> | <u>Column Description</u>  |
|---------------|--|
| 1             | NEC. NEC with 75 percent or less attainment                                |
| 2             | ALLOWANCE. Total of authorized NEC's reflected in manpower authorizations. |
| 3             | COB. Current on-board.   |
| 4             | DEFICIENCY. Difference between allowance and current on-board.             |
| 5             | PERCENT ATTAINMENT. Percent of allowance currently on-board.               |
| 6 - 10        | Same as columns one through five.  |



FACSO RPT SYW/NO. 04040/B2080R01

GEMS REPORT NO. 1200-002 PAGE 2

NMCB 1

BUILDER SKILLS

| SKILL LEVEL | STD REQ | MIN REQ | PROJ REQ | COB BASE | POB 3 BASE | POB 6 OTH | POB 9 BASE | POB 12 OTH | COMPARISON STD TO POB 6 +/- % | COMPARISON PROJ TO POB 6 +/- % |
|-------------|---------|---------|----------|----------|------------|-----------|------------|------------|-------------------------------|--------------------------------|
|-------------|---------|---------|----------|----------|------------|-----------|------------|------------|-------------------------------|--------------------------------|

PLANNING, ESTIMATING & SCHEDULING

|       |    |    |  |    |    |    |    |    |     |      |
|-------|----|----|--|----|----|----|----|----|-----|------|
| 2     | 5  | 3  |  | 3  | 1  | 2  | 1  | 1  | 3-  | 40.0 |
| 1     | 20 | 12 |  | 13 | 11 | 10 | 10 | 10 | 10- | 50.0 |
| TOTAL | 25 | 15 |  | 16 | 12 | 12 | 11 | 11 | 13- | 48.0 |

SAWFITTING

|       |   |   |  |   |   |   |   |   |   |       |
|-------|---|---|--|---|---|---|---|---|---|-------|
| 1     | 4 | 2 |  | 5 | 5 | 5 | 5 | 4 | 1 | 125.0 |
| TOTAL | 4 | 2 |  | 5 | 5 | 5 | 5 | 4 | 1 | 125.0 |

WOODWORKING & MILLWORKING

|       |    |    |  |     |   |    |    |    |    |       |
|-------|----|----|--|-----|---|----|----|----|----|-------|
| 2     | 4  | 2  |  | 2   | 1 | 1  | 1  | 5  | 3- | 25.0  |
| 1     | 35 | 22 |  | 111 | 5 | 94 | 88 | 75 | 59 | 268.5 |
| TOTAL | 39 | 24 |  | 113 | 5 | 95 | 89 | 75 | 56 | 243.5 |

FORMING & REINFORCING

|       |    |    |  |     |   |     |    |    |     |       |
|-------|----|----|--|-----|---|-----|----|----|-----|-------|
| 3     | 7  | 5  |  | 4   | 3 | 4   | 4  | 3  | 3-  | 57.1  |
| 2     | 32 | 21 |  | 25  | 1 | 16  | 14 | 11 | 16- | 50.0  |
| 1     | 54 | 36 |  | 97  | 8 | 89  | 81 | 69 | 35  | 164.8 |
| TOTAL | 93 | 62 |  | 126 | 9 | 109 | 99 | 83 | 16  | 117.2 |

MIXING, PLACING & FINISHING CONCRETE

|       |    |    |  |     |   |     |     |    |    |       |
|-------|----|----|--|-----|---|-----|-----|----|----|-------|
| 3     | 7  | 5  |  | 4   | 3 | 4   | 4   | 3  | 3- | 57.1  |
| 2     | 32 | 21 |  | 36  | 1 | 28  | 25  | 20 | 4- | 87.5  |
| 1     | 54 | 36 |  | 89  | 8 | 78  | 71  | 62 | 24 | 144.4 |
| TOTAL | 93 | 62 |  | 129 | 9 | 110 | 100 | 85 | 17 | 118.2 |

MASONRY UNIT CONSTRUCTION

|       |    |    |  |     |   |     |    |    |     |       |
|-------|----|----|--|-----|---|-----|----|----|-----|-------|
| 3     | 7  | 5  |  | 8   | 5 | 3   | 3  | 3  | 4-  | 42.8  |
| 2     | 32 | 21 |  | 22  | 1 | 16  | 15 | 12 | 16- | 50.0  |
| 1     | 54 | 36 |  | 90  | 6 | 81  | 73 | 64 | 27  | 150.0 |
| TOTAL | 93 | 62 |  | 120 | 7 | 100 | 91 | 79 | 7   | 107.5 |

FIGURE 1





FACSO RPT SYM/NO.04040/82090R01

GEMS REPORT NO. 1221-006 PAGE 6

NMCB 1

NAME \_\_\_\_\_

NS5

RATE

DISTR.  
RATE

|     |      |           |   |
|-----|------|-----------|---|
| NEC | 5515 | ALLOWANCE | 7 |
|-----|------|-----------|---|

[illegible]

### RATING TOTALS

|           |      |
|-----------|------|
| TOTAL NEC | 5515 |
|-----------|------|

NEC 5632 ALLOWANCE 3

1. The first step is to identify the problem or question that needs to be addressed. This involves understanding the context and the specific requirements of the task.

### RATING TOTALS

|           |      |
|-----------|------|
| TOTAL NEC | 5632 |
|-----------|------|

| NEC | 5642 | ALLOWANCE | 3 |
|-----|------|-----------|---|
| NEC | 5642 | ALLOWANCE | 3 |

1. The first step is to identify the problem or question that needs to be answered. This involves understanding the context and the specific requirements of the task.

RATING TOTALS

|           |      |
|-----------|------|
| TOTAL NEC | 5642 |
|-----------|------|

| RATE | 1500 |
|------|------|
|      | INST |
|      | REQ  |

| RATE | 1500 | ALLOW | COB | P081 | P0E2 | P0B3 | P0B4 | P0B5 | P0B6 | P0B7 | PQ88 | P0B9 | P0B10 | P0B11 | P0B12 |
|------|------|-------|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|
|------|------|-------|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|

FIGURE 2



| N E C   E X C E P T I O N   R E P O R T |           |     |            |                    |      |           |     |            |                    |
|---|-----------|-----|------------|--------------------|------|-----------|-----|------------|--------------------|
| FACSO RPT SYM/HO.04040/B2090R03         |           |     |            |                    |      |           |     |            |                    |
| NMCB 133                                |           |     |            |                    |      |           |     |            |                    |
| 75% OR LESS NEC ATTAINMENT              |           |     |            |                    |      |           |     |            |                    |
| NEC                                     | ALLOWANCE | COB | DEFICIENCY | PERCENT ATTAINMENT | NEC  | ALLOWANCE | COB | DEFICIENCY | PERCENT ATTAINMENT |
| 2516                                    | 1         | 0   | 1          | 0                  | 5902 | 5         | 3   | 2          | 60                 |
| 2525                                    | 1         | 0   | 1          | 0                  | 5908 | 2         | 0   | 2          | 0                  |
| 3122                                    | 1         | 0   | 1          | 0                  | 6012 | 6         | 3   | 3          | 50                 |
| 3528                                    | 2         | 0   | 2          | 0                  | 6013 | 4         | 0   | 4          | 0                  |
| 3532                                    | 2         | 0   | 2          | 0                  | 6014 | 4         | 0   | 4          | 0                  |
| 5632                                    | 3         | 0   | 3          | 0                  | 6017 | 3         | 1   | 2          | 33                 |
| 5642                                    | 3         | 1   | 2          | 33                 | 6021 | 2         | 0   | 2          | 0                  |
| 5644                                    | 3         | 1   | 2          | 33                 | 6104 | 3         | 2   | 1          | 66                 |
| 5709                                    | 3         | 1   | 2          | 33                 | 6117 | 2         | 1   | 1          | 50                 |
| 5711                                    | 2         | 0   | 2          | 0                  | 8412 | 1         | 0   | 1          | 0                  |
| 5304                                    | 2         | 1   | 1          | 50                 | 8425 | 3         | 0   | 3          | 0                  |
| 5901                                    | 5         | 3   | 2          | 60                 |      |           |     |            |                    |

FIGURE 3



## THE TRAINING FUNCTION

The authority and responsibility for training of Naval personnel is set forth in U. S. Navy Regulations, 1973. Article 0304 assigns to the Chief of Naval Operations the responsibility to train, equip, prepare and maintain the readiness of Naval Forces. Article 0318 states that the Chief of Naval Education and Training under the command of the Chief of Naval Operations shall be responsible for the training of Navy personnel, other than training assigned to other authorities.

Article 0728 charges the Commanding Officer with the responsibility to : (a) endeavor to increase the specialized and general professional knowledge of the personnel under his command by the frequent conduct of drills, and instruction, and by the utilization of appropriate fleet and service schools, (b) encourage and provide assistance and facilities to the personnel under his command who seek to further their education in professional or other subjects.

Beginning in FY-1973, the amount of training that the Department of Defense and the component services can provide will come under Congressional scrutiny with the passage of Public Law 92-430. This law requires that for each fiscal year, the Congress shall authorize the average military student loads for each component of the armed forces. This authorization is not required for unit or crew training student loads, but does apply to the following individual training categories: recruit and specialized training, flight training, professional training in military and civilian institutions, and officer acquisition training. Most of the technical training provided for Group VIII



personnel through formal schools is defined as specialized training and falls under these Congressional limitations. Reference 8 outlines procedures and responsibilities within the Naval Education and Training Command to comply with Public Law 92-436.

## 1. Formal Training

Formal training for enlisted personnel can be divided into two categories: Enlisted rating training and functional training. This paper is concerned primarily with the enlisted rating category of formal training, more commonly referred to as P, A, B or J, and C-School. Functional training provides training to personnel, often in a group or team situation, in the performance of specialized tasks or functions which are not normal to rating training of enlisted personnel. Embarkation training conducted by the Naval Amphibious Schools and the Chief Petty Officer (CPO) Course conducted by the Civil Engineer Corps Officers School are examples of functional schools. The Chief of Naval Education and Training has delegated to the Naval Technical Training Command (CNTT) the responsibility to coordinate and direct the technical training of Navy enlisted personnel including Group VIII personnel, [Ref. 9]. The training is accomplished by Naval Construction Training Centers (NCTC's) located at Gulfport, Mississippi and Port Hueneme, California. The two NCTC's are nearly mirror images of each other in structure, courses, and operation. Class P, A, E, and C-Schools for all Group VIII ratings are taught at the NCTC's. Course listings and convening dates are contained in Ref. 3. A brief description of each of the formal schools follows:

Class P-Schools are designed to provide training in





basic skills common to all construction ratings. Personnel are provided the basic knowledge necessary for advancement to Constructionman. Because of the nature of the training, all input is directly from recruit training graduates.

A-Schools are, in general, designed to provide basic technical knowledge and skills necessary to prepare for the lower petty officer rates. Input can be directly from recruit training or from Fleet personnel who went directly to the Fleet without having attended A-School. In FY-1976, all school eligible Group VIII recruits were sent directly to A-School from recruit training centers.

B-Schools are designed to provide the advanced technical knowledge and skills required to advance to the higher petty officer rates. Personnel become eligible for B-School when advanced to E-5 provided they have sufficient time in service remaining on their enlistment. Currently, input to B-School is estimated based on a percentage of on-board strength of E-6 personnel in each rating. It should be noted that the designation of these schools as B-Schools is being eliminated and they are now to be termed C-7 Schools or C-7 Schools. This paper will retain the old designation because it is consistent with most of the applicable instructions and references.

C-Schools train enlisted personnel in a particular skill or technique which, in general, is not peculiar to any one rating or broad occupational field. Graduates of C-Schools are normally assigned a Navy Enlisted Classification Code.



## 2. Fleet Training

One of the most significant factors affecting the operational readiness of a unit is the training of its personnel and their resultant capability to perform in a potentially hostile environment. It is neither expected or desired that all of the training necessary to field a combat ready unit be provided by the formal schools commands. The fleets have traditionally provided for the shorter-range training needs of its units. The type of training included under the broad definition of Fleet training includes the following:

General Military Training, (GMT), is training in non-technical areas related to Navy orientation and guidance. Continuing GMT is required at the unit level to reinforce and motivate personnel toward overall Navy goals and objectives, [Ref. 10].

Military training for NCF personnel involves weapons training, training in defensive operations, communications training, and tactics. Military training is conducted by the homeport NCR, and is supported with Fleet funds and personnel. Military training objectives are promulgated in COMCBPAC/CCMCBLANT Instruction, [Ref. 7].

Recognizing the need for supervisory and leadership training for first line supervisors, the Fleet has established a Petty Officers Academy at each NMCB homeport to provide formalized instruction in this area. Convening dates and quotas for the academy are coordinated with NMCB rotation schedules.



The homeport NCR is the overall coordinator for the various programs included in the general category of the Navy Human Goals Program, [Ref. 11].

Crew training of NMCB personnel in a variety of areas is supported by the homeport NCR. Such training is arranged and conducted by the NMCB as a part of the homeport training cycle.

Special SEABEE Training Courses, (SCBT), are conducted by the Naval Construction Training Centers using instructors and training support funds provided by the homeport NCR. The courses are, in most cases, extracted directly from formal Class A or B-Schools, covering specific individual rating skills defined in PRCP. Quota control and course offerings are determined jointly by the homeport NCR and NCTC. SCBT courses currently offered at NCTC, Port Hueneme are listed in Appendix A and Ref. 12.

### 3. Factory Training

Factory training usually involves the use of representatives of a vendor or manufacturer to provide instruction on the operation of a particular piece of equipment or a system. The instruction may take place at the contractor's plant, at a Navy school, or on a Navy ship or shore station. Factory training for Group VIII personnel is sponsored by the Civil Engineering Support Office, Naval Construction Battalion Center, Port Hueneme, California in accordance with Ref. 13.



## . THE PEACETIME ROLE OF THE SEABEES

The primary mission of the NCF during peacetime is training in preparation for future contingency situations, Ref. 1]. It is uniquely true for the NCF, however, that a secondary benefit to be derived from this training is the construction of operational facilities in support of other units in the Fleet.

### 1. Project Selection Criteria

The construction projects which are undertaken by NMCB's while they are deployed are selected by the Fleet Commanders-in-Chief based primarily on the training value of the project. Projects which are highly repetitive, require limited numbers of skills or are not consistent with the mission of NMCB's are not approved unless there are important overriding considerations. Prospective projects are reviewed by COMCBPAC and COMCBLANT as part of the review and approval process. One of the primary purposes of this review is to select from the list of possible projects those best suited for NMCB accomplishment and which contribute most to maintaining readiness for contingency operations.

Regardless of the care exercised during the project selection and approval process, the projects selected may not always exercise all of the skills that the NMCB is required to maintain in inventory. For example, in peacetime, it is difficult to find good training projects that utilize waterfront construction and advanced base construction skills because these types of facilities are typically not expanded except during wartime. Proficiency





in these types of projects is, however, essential to the mission of the NMCE, and must be periodically reinforced.

Projects such as the construction of facilities at Diego Garcia in the Indian Ocean are well suited to NMCE readiness training because of the wide range of skills that are required for such programs. It is an unfortunate fact that during any one deployment, the number of skills that are required for the assigned project workload are, in all probability, specialized and that many individuals will not receive occupational on-the-job (OJT) training in areas they need for advancement and for contingency operations.

Because of the nature of construction, each phase of the project must follow in logical sequence. The type of practical OJT that an individual gets depends of the type of projects and the stage of construction of the project at the time. OJT training on deployment projects cannot provide all of the training in all of the skill areas that are specified for contingency operations. It is essential that a solid background in contingency type training be maintained at the homeport NCR and the homeport NCTC.

When the NCF undertakes a construction project there is nearly always the requirement that the unit complete the project within a reasonable time limit barring contingency redeployments or emergencies, and within the budgeted amount. The NMCE is placed in a position of balancing training against production efficiency.

## 2. Skill Demands of Projects

NMCE's are usually aware of the projects that they will be assigned before they begin the homeport cycle. With the knowledge of the skills that will be needed to



successfully execute the projects and using the PRCP skill inventory management system, the unit is able to plan and schedule the specific training necessary for deployment project execution and individual advancement.



### III. ANALYSIS

#### 1. ENVIRONMENTAL CONSIDERATIONS

The training plans and programs of the Group VIII community are influenced and constrained by important trends and factors beyond the control of OP-099 and the Fleets. The nature and direction of funding trends, the effect of post-Vietnam drawdown on the composition and size of the CF, the changing role of the Naval Reserve, the All Volunteer Force, and the economic conditions in private industry all impact on the training programs for SEABEES. These environmental constraints effect the entire Department of Defense budget and are forcing improved management with fewer resources. In 1975 [Ref. 17], then Secretary of Defense James R. Schlesinger reported to Congress that the economic conditions of the country, the tight constraints on the defense budget, and the related size of forces has caused DOD to scrutinize with particular care the way in which military manpower resources are being used.

##### 1. Manning Levels

The past decade has seen considerable change in the size and configuration of the NCF. SEABEE strength more than tripled in a four year period from 9,891 in FY65 to 9,813 in FY75, and the authorized FY75 allowance is 9,357. The NCF increased in number from 10 to 22 NMCB's during the eight of the Vietnam War, and then dropped to the nine



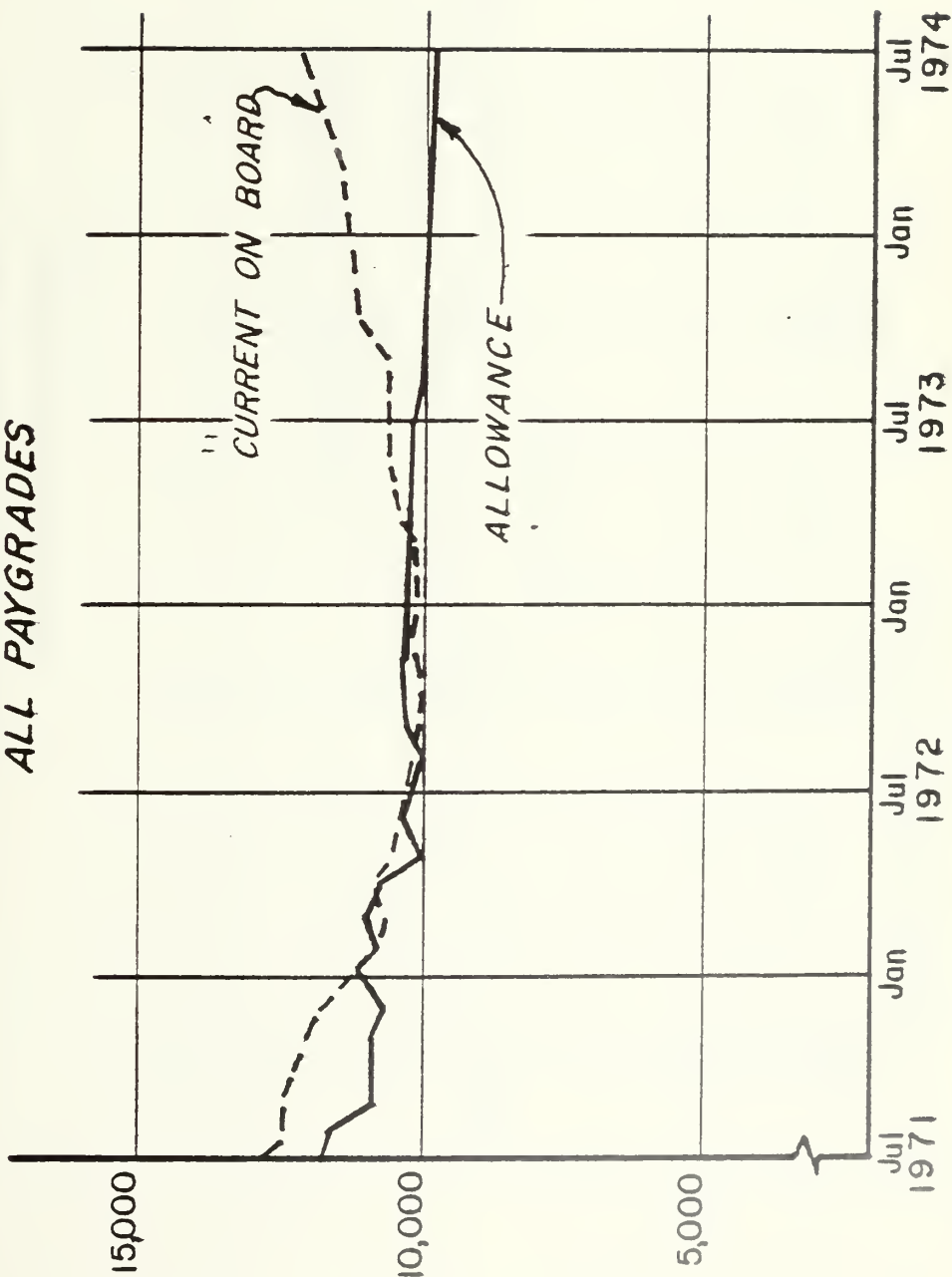
attalions currently authorized. One additional NMCE will be lost in FY76. Otherwise, future manning levels and inventory of organized units are expected to stabilize at approximately the current levels. Management actions required to accommodate the last five years of declining strength as well as uncontrollable factors such as budget reductions, changing enlistment and reenlistment propensities, and large changes in the size of the NCF have resulted in a NCF that is not particularly well distributed by skill and by experience level (length of service). The CF has experienced large shortages in E-5 and E-6 pay grades and compensating excesses in personnel of pay grade E-4 and below. Figures 4 through 7 show the strength versus allowance conditions for 1971 through 1974.





FIGURE 4

COMPARISON OF GROUP VIII  
STRENGTH versus ALLOWANCE  
ALL PAYGRADES

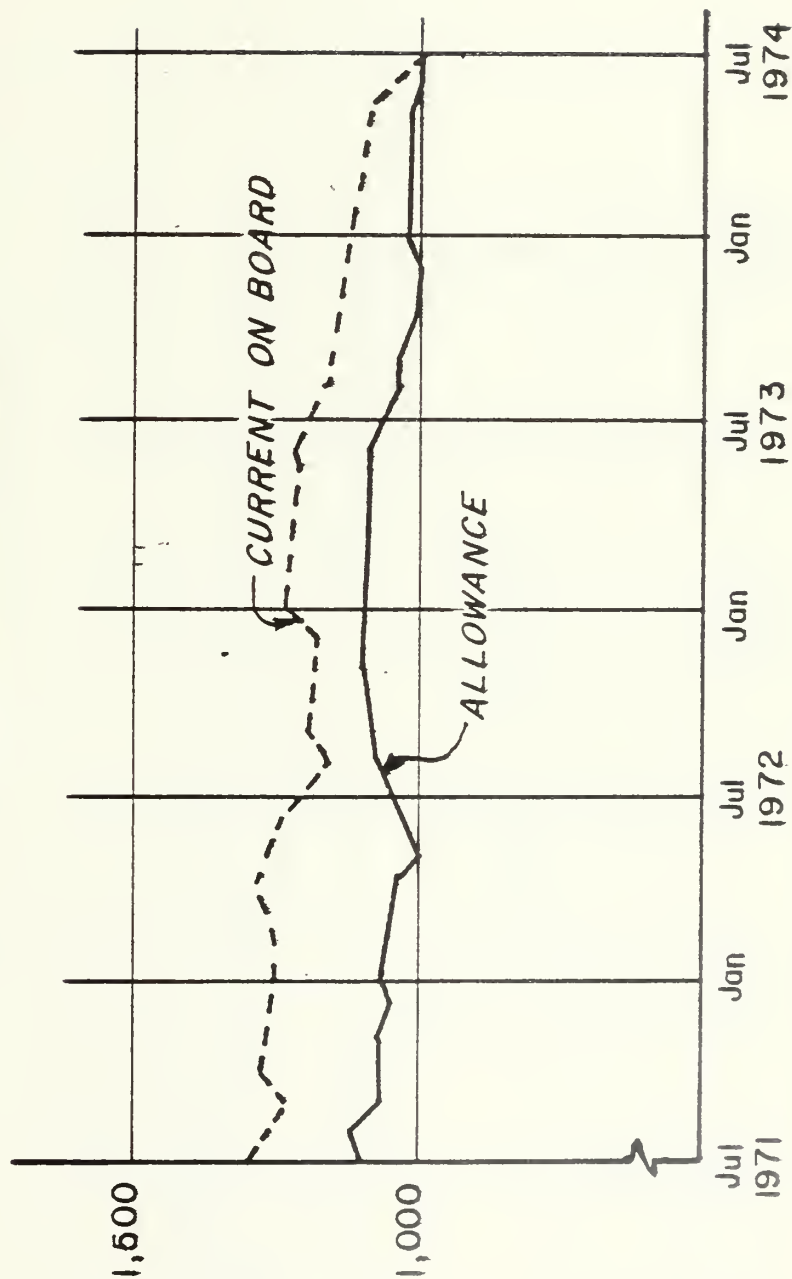


Source: Reference 24, p.18.



FIGURE 5

COMPARISON OF GROUP VIII  
STRENGTH versus ALLOWANCE  
E-7 - E-8 PERSONNEL

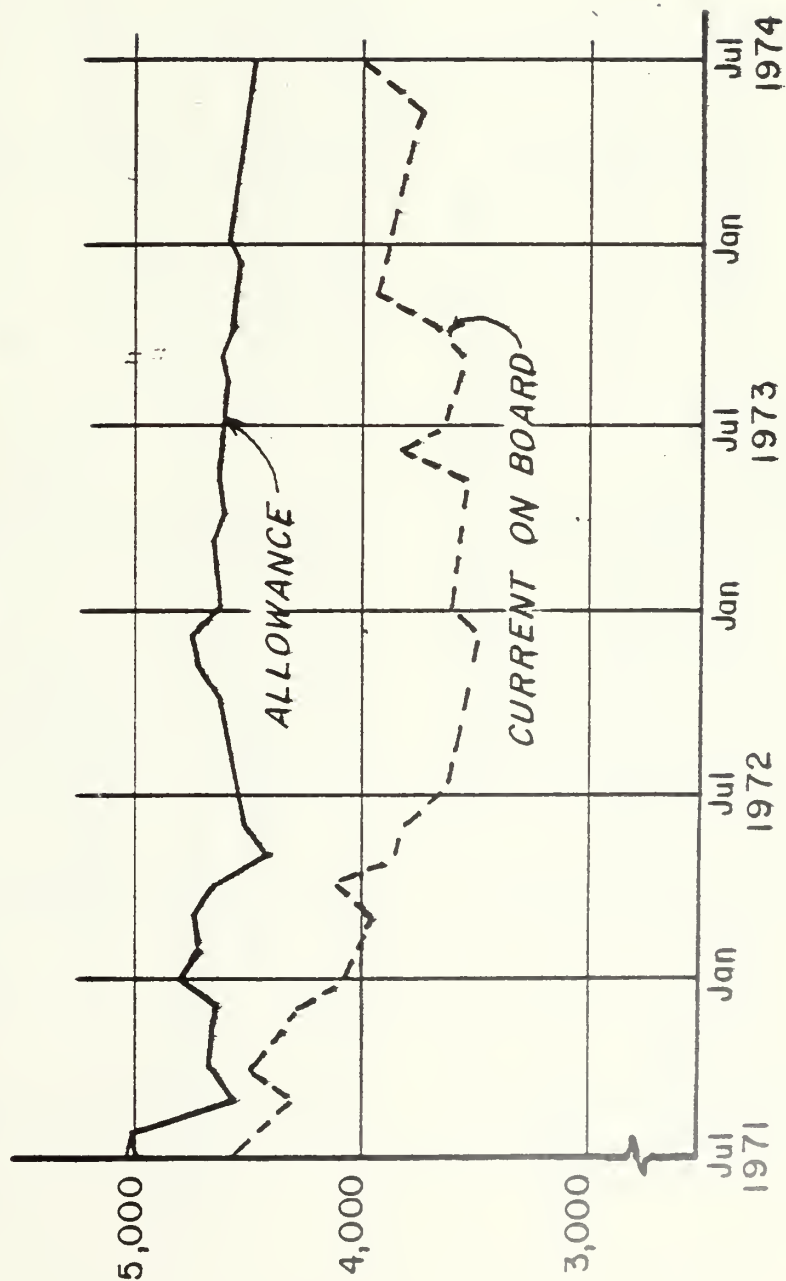


Source: Reference 24, p.15.



FIGURE 6

COMPARISON OF GROUP VIII  
STRENGTH versus ALLOWANCE  
E-5 - E-6 PERSONNEL

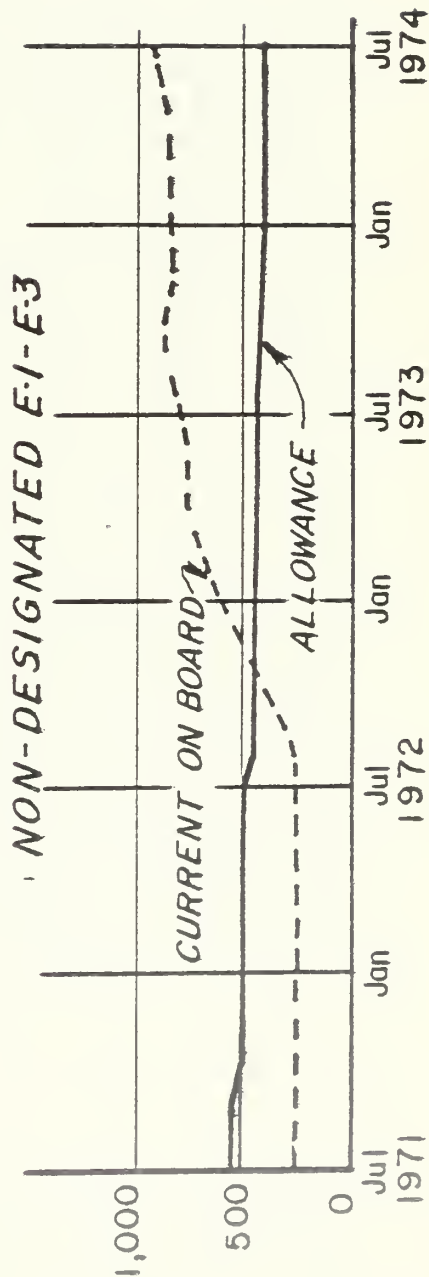
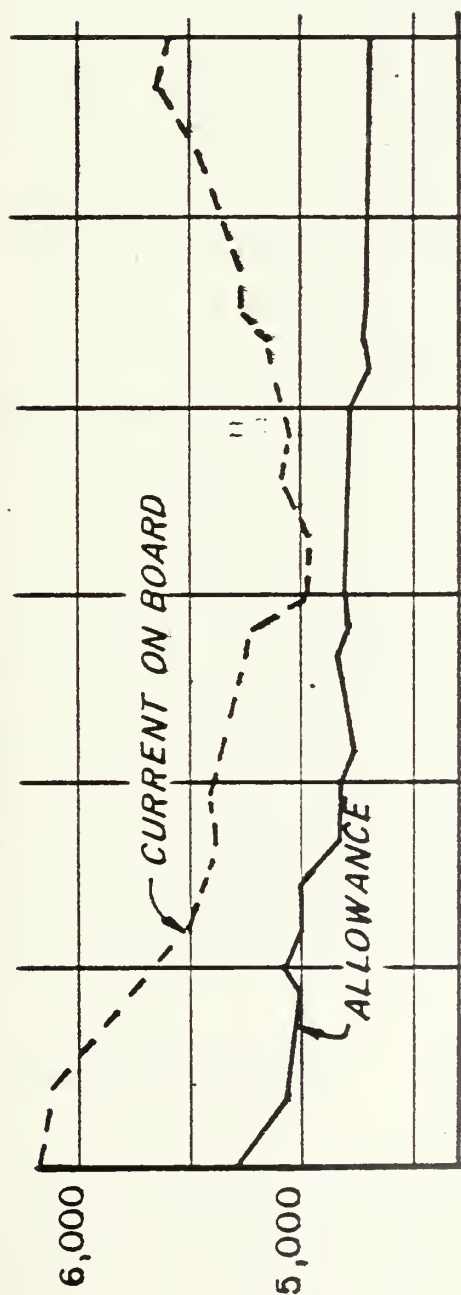


Source: Reference 24, p.16.



FIGURE 7

COMPARISON OF GROUP VIII  
STRENGTH versus ALLOWANCE  
DESIGNATED E-1-E-3



Source: Reference 24, p.17.





## 2. The All-Volunteer Force

The termination of the draft and the initiation of programs for achieving the All-Volunteer Force have had significant impact on the Group VIII ratings and the NCF. The Navy must now compete with industry and other military services for manpower. Emphasis is being given to the Navy Human Goals Program, to increased training opportunities, to better pay, to better living conditions, and to improved advancement opportunities. From all indications, the All-Volunteer Force is a success as adequate volunteers are available to maintain manning levels. Also, SEABEE first term reenlistment rates have increased from the 5-year average of 7% during fiscal years 1968 through 1972 to 50% in FY74 and 38% in FY75 [Ref. 21]. During this same period, however, male unemployment in the U.S. increased from 2.9% of the civilian labor force in 1968 to 8.3% in April 1975 [Ref. 15]. Also, U.S. spending for construction decreased from approximately \$135 Billion seasonally adjusted rate in December 1972 to a low of \$120 Billion in May 1975 [Ref. 6]. By February 1976, construction spending recovered to approximately \$140 billion. With increased opportunity for construction workers in the civilian industry, the Navy and the SEABEE community will be hard pressed to maintain favorable retention rates and recruitment levels.

## 3. The Total-Force Concept

In the annual Defense Department report to Congress on the FY76 and FY77 Defense Budgets [Ref. 17], Secretary Schlesinger stated that DOD is placing more reliance on the Reserve Forces to get greater combat strength for the defense dollar. As a result, a realigned Reserves policy is



merging. Initiatives are now underway to expand Reserve missions, to increase material readiness, and in general, link the Navy Reserve directly into combat missions which are consistent with national security strategy. A Total Force study under sponsorship of the Secretary of Defense, is now being concluded which considers the availability, force mix, limitations and potential of reserve components. The broad goals of the study group were to identify functions and missions which could be converted to more useful functions, and places where modification to the reserves are warranted to improve readiness and capability upon mobilization. Associated with the Total-Force Concept, the Reserve Naval Construction Force has been programmed for reduction from 17 to eight Battalions in FY77 [Ref. 20]. The smaller Reserve NCF, however, is expected to be brought to higher levels of readiness.



## . COST CONSIDERATIONS

Historically, the long existence of the draft and low pay scales for E-1 to E-3 personnel has led to a general attitude among military leaders that the services of these personnel were not a significant cost factor. The major emphasis for cost savings has traditionally been in the equipment or supplies area, since personnel in the lower pay rates were provided in relatively large numbers at low cost. As a result of pay raises since 1971 resulting from the initiation of the All-Volunteer Force, non-rated men can no longer be considered inexpensive or free goods. The roughly 33 percent increase in regular military compensation across the first three pay grades has raised the pay of an E-3 with dependents to the equivalent of a semiskilled production worker. In January, 1972, his regular military compensation on the basis of a 40-hour week was about \$2.86 per hour. By October 1975, it increased to \$3.37 per hour.

In 1971, Weiner and Horowitz [Ref. 18] compared the cost of training an A-School graduate to the cost of training a man who did not attend A-School to an equivalent skill level. The problem was approached by asking the opinions of over 1900 senior enlisted men about the training progress of A-School graduates versus those who did not attend school. From their opinions, embodied in the responses to a carefully designed questionnaire, it was possible to ascertain their estimates of the cost of the on-the-job training. The study considered trainee salaries and benefits as a training cost, but the value of productive contribution of trainees undergoing on-the-job training was deducted from the cost of such training. The study points out that one of the important costs of training a man



n-the-job is the work must be foregone by the men who are training him. Thus, if an E-3 takes more senior men in his work area away from their normal work to teach him a skill, he is costing the Navy the value of that undone work by both men.

The A-School study concluded that requisite skill levels for all ratings can be achieved through experience on the job, but A-School graduates take less time to become proficient than the nongraduates. It was further concluded that A-School graduates are more productive during the on-the-job training period and if total costs are considered, formal schools appear more efficient for virtually all ratings. These results can be extended to other occupational training such as B-School, C-School, and CBT courses.

The preferred training sequence, particularly for construction skills is formal classroom instruction followed by practical application of the instruction on the job. In this situation, the individual receives the basic knowledge necessary, the safety training related to the skill, and is generally trained in the correct way to do the job. These basic skills can be refined under the general direction and supervision of more senior personnel on the job. Learning is increased at a much more rapid rate. Conversely, much of the value of formal training is lost when an individual is exposed to basic skill training in the classroom, but has no opportunity to utilize and develop proficiency in the skills during deployment.

Each of the Group VIII ratings utilize skills found in several civilian occupational specialties. For example, the Builder rating includes skills encompassing the occupations of brick mason, tile setter, stone mason, rough carpenter, finish carpenter, millwright, cabinetmaker, and so forth.





n the civilian construction industry, it is common to hire journeyman labor in any one of these occupational areas when the need arises, and to release them when the specific work is accomplished. The SEABEE Builder is, conversely, expected to be proficient in all of these occupational areas because, unlike the civilian construction industry, the workforce of the NMCB is rigidly fixed.

In the past, the utilization of formal schools by Reserve Group VIII personnel has been limited. The formal schools are usually several weeks in length, and Reserve personnel are on active duty for only a two week period each year. Also most of the SEABEE Reservists are employed in the construction industry, or in a related occupation, and are journeyman craftsmen in the civilian jobs. Advanced training in all aspects of their rating would be redundant in many skill areas, but very necessary in others. As a result, SCBT courses which are one to two weeks in length have dominated the Seabee Reserve individual training program.



## C. TRAINING EFFICIENCY

In January 1975, CNET faced a funding decrease totalling \$75 million in FY 1977. Included in CNET's proposal to reduce its expenditures was an item to disestablish the Group VIII formal B-Schools at Port Hueneme and Gulfport. CNET indicated that this action would eliminate 193 billets, (173 students and 20 instructors) and save an estimated \$1.8 million [Ref. 22]. This step would tend to transfer a training problem to others, presumably the Fleets, and before such a step is taken, other possible areas of economy should be investigated. Two areas which show promise are the one station training concept, and the implementing of a validation procedure for formal courses of instruction.

### 1. One Station Training

On a DOD-wide basis, the average recruit spends about five months of the first tour in achieving his initial skill and travelling to his first assignment. In FY 1975, less than five percent of the personnel completing basic training went directly to a unit. The other 95% went on to advanced training centers or to one of the technical service schools. To improve the quality of training and reduce the travel and waiting time, the Army is undertaking a new training concept called One Station Training [Ref. 17]. This is a system of initial entry training management for all enlisted personnel which minimizes the turbulence during training of new enlistees and economizes on the structure of the training base. These goals are achieved by conducting all stages of initial entry training for most enlistees at a single training base. The program calls for designation of



an individual's initial entry training program immediately upon his enlistment at the Armed Forces Entrance and Examination Center, and will result in a predetermined flow for the individual through training, usually at a single installation, to his first unit.

The one station concept appears to have considerable merit for the Group VIII ratings. At present, enlistees receive basic training at one of the three recruit training centers at Great Lakes, San Diego, or Orlando. Upon completion of basic training, the individual travels to a NCTC for occupational training in A-School. There is usually some waiting time at the NCTC since A-School convening dates are not necessarily coordinated with recruit graduation dates. After completion of A-School, the individual joins his first unit. If the individual is assigned to an NMCB which is deployed, a decision has to be made whether to have the man join the Battalion or to hold him at homeport to await the return of the unit. Another aspect of the scheduling problem is that when held in homeport, the individual can be a liability rather than an asset, since management personnel must be available to supervise him.

The one station concept whereby SEABEE recruit training is conducted at a NCTC could reduce or eliminate the travel and waiting time for new enlistees by making sequence scheduling possible. This concept would also permit the tailoring of the recruit training program to delete those portions which relate entirely to the shipboard Navy and concentrate on those which relate to the SEABEES. For example, shipboard damage control training provides little utility to the SEABEE, yet defensive military training is absolutely necessary.

The major factor which might preclude the one



station concept is the adequacy of the facilities at the CBC's to accommodate the increased student load. The recruit input into the construction ratings is expected to average less than 2000 men per year for the foreseeable future. This equates to about 230 average recruit base loading increase per CBC. Considering the expected decrease in personnel awaiting transfer to their unit, this increased base loading could be considerably reduced.

## 2. Duplication of Training

Most of the individual rating skills required by the Fleets for the standard NMCB can be obtained through formal schools or through SCBT courses. Since most of the SCBT courses come directly from the formal schools curriculum [Ref. 12] personnel have probably been exposed to some of the training provided at the formal schools at a previous time. There is some benefit to be derived from a refresher in the course area, but if training resources are as severely constrained as appears to be the case, it is possible that better use of the time could be made. If careful records of SCBT courses attended were maintained, and included in the PRCP system, and a validation procedure initiated which would eliminate the re-exposure to course material, the length of the formal schools, and hence their cost might well be reduced.





#### D. SYSTEM CONSIDERATIONS

Anthony, Deardon, and Vancil [Ref. 19] point out in their discussion of the requirements of management control systems, that it should be a coordinated, integrated system; that is, although data collected for one purpose may differ from those collected for another purpose, these data should be reconcilable with one another. In a sense, the management control system should be a single system, but it is perhaps more accurate to think of it as a set of interlocking subsystems. The purpose of any management control system should be to encourage managers to take actions that are in the best interest of the entity. Technically, this purpose can be described as "goal congruence".

The management control systems controlling Group VIII training appear to lack this vital element of goal congruence. The active and reserve Naval Construction Force have each established training objectives in terms of specific skills which are defined in the PRCP. Annually, BUPERS and CNO (OP-099) establish formal training objectives, not on the basis of PRCP, but on other factors. A-School and P-School plans are closely linked to accession programs, and C-School requirements are determined based on a comparison of NEC requirements versus assets. B-School requirements are based on a percentage of on-board E-6's in each rating. With the exception of C-School, which can be correlated with PRCP skills, COMCBPAC, COMCBLANT, and COMFIRSTRESNAVCONSTBRIGADE have not established quantitative requirements for the formal schools. Management information reports associated with the PRCP encourage NMCB's to structure their training plans to correct PRCP deficiencies



and since A-School and B-School provide training in "packages" of skills, it is easier for NMCB's to correct PRCP deficiencies with SCBT courses. In most cases, there is no incentive for the NMCB to send critically needed personnel to A or B-School, and the unit is actually penalized because the travel and per diem costs affect the unit's operating budget. These shortcomings in the current system create a tendency to rely on the training courses available during the homeport training cycle for correction of deficiencies. As a consequence, SCBT courses, which directly correlate to PRCP deficiencies have become the most demanded form of Group VIII training.

COMCBPAC, COMCELANT, and COMFIRSTRESNAVCONSTBRIGADE are committed to the PRCP for skill management and control. It would be desirable if the formal schools training program could be managed using the same system to generate requirements data. The COMCBPAC/COMCELANT joint training and skill requirements are reviewed and updated on an annual basis at a conference workshop of various representatives having expertise in the general areas of skill requirement definition, training execution, training management, and manpower management. The annual training conferences are relatively recent developments. The most recent conference was held in June 1975.

#### 1. Formal Schools Training System

Training requirements are determined by the CNO (OP-099), generally utilizing the recommendations provided by CHNAVFERS (Pers-2). Aside from A and P-Schools, which are closely identified with accession programs, E and C-Schools constitute the bulk of the formal training program. School quotas are approved after resource allocation to the various schools and training activities is



made.

a. P-School Planning

Group VIII personnel recruited with a 3-year obligation under the SEAFARER program are guaranteed 4 weeks of P-School apprentice training before assignment to the Fleet. This program was terminated for SEABEES in 1975, however, 1708 recruits attended P-School in fiscal years 1973 and 1974.

b. A-School Planning

A-School quota planning is tied directly to the personnel acquisition or accession programs. Personnel recruited under the School Guarantee Program and the Occupational Specialty School Guarantee Program are guaranteed A-School training. Input into A-School in FY 1974 and FY 1975 was 2,326 and 3,157, respectively. Utilization was 101% and 105% of planned quotas. Table IV provides a breakdown of A-Schools utilization by rating for FY 1974.



TABLE IV  
GROUP VIII A-SCHOOLS  
QUOTAS vs UTILIZATION FY 1974

| <u>Rating</u> | <u>Quota</u> | <u>Recruit<br/>Input</u> | <u>Fleet<br/>Input</u> | <u>Total<br/>Input</u> | <u>Percent<br/>Utilized</u> |
|---------------|--------------|--------------------------|------------------------|------------------------|-----------------------------|
| EA            | 85           | 57                       | 42                     | 99                     | 117                         |
| BU            | 648          | 522                      | 163                    | 685                    | 106                         |
| SW            | 167          | 130                      | 46                     | 176                    | 105                         |
| UT            | 357          | 291                      | 67                     | 358                    | 100                         |
| CE            | 339          | 268                      | 71                     | 339                    | 100                         |
| EO            | 461          | 351                      | 48                     | 399                    | 88                          |
| CM            | <u>24</u>    | <u>237</u>               | <u>33</u>              | <u>270</u>             | <u>106</u>                  |
| Total         | 2311         | 1856                     | 470                    | 2326                   | 101                         |

Source: Reference 24, page 77.





### c. E-School Planning

The average annual input for B-Schools was 345 for FY 1974 and FY 1975. In FY 1976, the planned input is 340. The students are administered and instructed by a staff of approximately 20 Navy personnel. Costs to operate these schools average \$635 per student or \$220,000 per year. Utilization of the B-Schools has been very high since 1974 and 105% of the quotas available have been taken. The present method used by BUPERS to determine B-School requirements calls for training 20 percent of the current on-board strength of E-6 personnel in each rating. This formula assumes that sufficient quotas will be provided under an ideal force structure to insure all eligible personnel being sent through B-School at the 10-12 year point in his career. Table V displays the 31 January 1975 Navy-wide inventory of B-School graduates compared with the total Navy personnel allowance in each rating. From a review of these data, it appears that an equitable distribution of resources to the different ratings is not being achieved (A proposed model to help more equitably distribute the school quotas is discussed in later sections of this paper). The reason for this situation is that the various ratings have different accession, advancement, and retention rates.

Another concern associated with B-Schools is that COMCEPAC, COMCBLANT, and COMFIRSTRESNAVCONSTBRIGADE have not stated a B-School requirement which can be quantified. There is general agreement that the B-Schools are desirable and should be continued, however active and reserve requirements are expressed in terms of PRCP skills. Skill inventory management and training performance evaluation is done in terms of PRCP skills, not formal



schools utilization, and the Fleet's case for continuance of E-Schools is weakened because there is no apparent requirement for this school. A proposed method of determining E-School requirements based on PRCP skill deficiencies will be discussed later in this paper.



TABLE V  
B-SCHOOL GRADUATES BY RATING, E-5 - E-6 PERSONNEL  
As of 31 July 1975

E-5 PERSONNEL

| <u>Rating</u> | <u>Allowance</u> | <u>On-board</u> | <u>% of<br/>Allowance</u> | <u>% of<br/>On-board</u> |
|---------------|------------------|-----------------|---------------------------|--------------------------|
| EA            | 85               | 123             | 7                         | 5                        |
| CE            | 395              | 406             | 16                        | 15                       |
| EO            | 434              | 504             | 44                        | 38                       |
| CM            | 349              | 377             | 26                        | 24                       |
| BU            | 593              | 573             | 15                        | 15                       |
| SW            | 157              | 157             | 20                        | 20                       |
| UT            | 338              | 315             | 19                        | 20                       |

E-6 PERSONNEL

| <u>Rating</u> | <u>Allowance</u> | <u>On-board</u> | <u>% of<br/>Allowance</u> | <u>% of<br/>On-board</u> |
|---------------|------------------|-----------------|---------------------------|--------------------------|
| EA            | 69               | 74              | 32                        | 30                       |
| CE            | 250              | 245             | 34                        | 34                       |
| EO            | 377              | 360             | 46                        | 48                       |
| CM            | 279              | 266             | 36                        | 38                       |
| BU            | 440              | 431             | 41                        | 42                       |
| SW            | 169              | 169             | 31                        | 31                       |
| UT            | 229              | 217             | 37                        | 39                       |

Source: Civil Engineering Support Office, Naval Construction Battalion Center, Port Hueneme, California letter to Naval Facilities Engineering Command, Subject: B-School graduates versus stated requirements, dated 22 September, 1975.



#### d. C-School Planning

Since C-School requirements are based on an inventory management model that considers the current inventory of NEC's and planned gains and losses, a reasonably accurate requirement for these schools can be generated. Input into the C-Schools in FY 1974 was 506. In FY 1975, the planned input was increased to 838. Table VI reflects the FY 1974 utilization.





TABLE VI  
UTILIZATION OF GROUP VIII C-SCHOOLS  
Fiscal Year 1974

| <u>NEC</u> | <u>School</u>                    | <u>Quota</u> | <u>In-<br/>put</u> | <u>Percent<br/>Utilized</u> |
|------------|----------------------------------|--------------|--------------------|-----------------------------|
| 5515       | Planner and Estimator            | 44           | 47                 | 106                         |
| 5644       | Cable Splicing Technician        | 15           | 16                 | 107                         |
| 5707       | Water Well Drilling Technician   | 0            | 11                 | -                           |
| 5708       | Blaster                          | 0            | 18                 | -                           |
| 5709       | Crushing/Screening Plant Tech.   | 11           | 14                 | 127                         |
| 5711       | Grade Foreman                    | 19           | 22                 | 115                         |
| 5712       | Asphalt Paving/Plant Op Tech.    | 12           | 36                 | 216                         |
| 5801       | Auto Trans and Hyd. Mechanic     | 19           | 23                 | 121                         |
| 5802       | Automotive Electrical Technician | 20           | 24                 | 120                         |
|            | Shop Stores Procedures           | 48           | 47                 | 97                          |
| 5901       | Builder (Concrete)               | 23           | 38                 | 165                         |
| 5902       | Masonry Tech.                    | 40           | 45                 | 112                         |
| 5904       | Millworker                       | 23           | 28                 | 121                         |
| 5906       | Heavy Construction Tech.         | 59           | 52                 | 88                          |
| 5908       | Tool and Equipment Tech.         | 22           | 23                 | 104                         |
| 6017       | Sheetmetal Tech.                 | 42           | 32                 | 76                          |
| 6021       | Safety Inspector                 | 0            | 0                  | -                           |
|            | Welder Certification             | 50           | 48                 | 96                          |
| 6102       | Shorebased Boiler Controls Tech. | <u>26</u>    | <u>22</u>          | <u>84</u>                   |
| Totals     |                                  | 423          | 506                | 120                         |

Source: Reference 24, page 77.



## 2. Coordination of PRCP and Formal Training

### a. E-School Requirements based on PRCP

Most of the individual rating skills listed in PRCP may be acquired through completion of formal CNET schools. The applicable formal schools that lead to the PRCP skills are listed in Ref. 7. With this correlation of formal schools and PRCP, it should be possible to equate formal schools training requirements to PRCP skill deficiencies. For the Builder rating, for example, the following skills are obtainable through Builder E-School [Ref. 7, p.22]:

| <u>SKILL TITLE</u>                   | <u>NO.</u> | <u>LEVEL</u> |
|--------------------------------------|------------|--------------|
| Planning and Estimating              | 103        | 1            |
| Woodworking and Millworking          | 110        | 1            |
| Concrete Forming and Reinforcing     | 130        | 2            |
| Mixing, Placing, and Finishing Conc. | 132        | 2            |
| Masonry Unit Construction            | 140        | 2            |
| Light Frame Construction             | 150        | 2            |
| Finish Carpentry                     | 164        | 2            |
| Plastering                           | 166        | 1            |
| Heavy Construction                   | 170        | 2            |

In Table VII, the current on-board inventory on 30 November 1975 for the Builder rating is compared with the standard NMCB requirement. These data show that on the average, the NMCB inventory of these skills is above the standard requirement in all skills except 170/2, Heavy Construction, Level 2. In this skill, all NMCB's are below



standard. Assuming that the PRCP skill inventory accurately represents the actual conditions, there is apparently little or no requirement for Builder B-School. The skill deficiencies can be corrected more economically with SCBT courses. Tables VIII and IX provide a similar analysis for the Construction Electrician rating. Table VIII lists the skills that are obtainable through Construction Electrician E-School and Table IX lists the current inventory of the skill in each battalion. The standard NMCB requirement is also shown for comparison purposes. The most severe deficiency exists in NMCB 10 where there is a shortage of six in skill 212/2 and three in skill 220/2. These data would appear to demonstrate that, while skill deficiencies exist in all ratings, personnel are not deficient in all of the skill areas encountered at B-School, and shorter courses aimed at specific deficiencies may better serve to reduce skill shortages than attendance at a full term at B-School.

Personnel entering B-School following a normal tour of shore duty will not have had the opportunity to complete SCBT courses and will likely require the entire B-School curriculum. Also, B-Schools for some of the Group VIII ratings are given college credit by some Colleges, Universities, and Trade Schools. The B-School certificate of completion therefore has considerable value to the individual beyond Navy career considerations. For these reasons, E-School should not be disestablished. As will be discussed, however, a validation procedure for those portions of E-School completed before actual entry to the school does appear warranted.



TABLE VII  
BUILDER SKILLS  
COMPARISON OF SKILL ASSETS VERSUS REQUIREMENTS  
FOR PRCP SKILLS OBTAINABLE AT B-SCHOOL  
 (By Naval Mobile Construction Battalion)

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|               |     |     |     |     |     |     |     |     |     |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Skill No.     | 103 | 110 | 130 | 132 | 140 | 150 | 164 | 166 | 170 |
| Skill Level   | 1   | 1   | 2   | 2   | 2   | 2   | 2   | 1   | 2   |
| NMCB Std Regt | 17  | 30  | 28  | 28  | 28  | 26  | 12  | 31  | 27  |

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|          |    |     |    |    |    |    |    |    |    |
|----------|----|-----|----|----|----|----|----|----|----|
| NMCB 1   | 13 | 112 | 25 | 36 | 22 | 28 | 25 | 90 | 20 |
| NMCB 3   | 11 | 91  | 20 | 25 | 27 | 30 | 30 | 49 | 19 |
| NMCB 4   | 22 | 105 | 38 | 37 | 37 | 50 | 54 | 71 | 20 |
| NMCB 5   | 31 | 116 | 29 | 33 | 28 | 32 | 27 | 64 | 13 |
| NMCB 10  | 37 | 107 | 42 | 65 | 48 | 47 | 41 | 59 | 17 |
| NMCB 40  | 10 | 99  | 23 | 38 | 20 | 32 | 31 | 48 | 12 |
| NMCB 62  | 21 | 104 | 35 | 33 | 35 | 30 | 23 | 56 | 19 |
| NMCB 74  | 31 | 96  | 25 | 35 | 30 | 33 | 39 | 51 | 12 |
| NMCB 133 | 25 | 101 | 29 | 44 | 21 | 32 | 25 | 50 | 9  |
| Average  | 22 | 103 | 30 | 38 | 30 | 35 | 33 | 60 | 16 |

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Source: PRCP Skill Strength Report, GEMS Report  
 No. 1200-002 dated 30 November 1975.





TABLE VIII  
CONSTRUCTION ELECTRICIAN  
FRCP SKILLS OBTAINABLE THROUGH B-SCHOOL

| <u>Skill No.</u> | <u>Skill Level</u> | <u>Skill Title</u>                      |
|------------------|--------------------|---|
| 203              | 1                  | Planning and estimating                 |
| 212              | 2                  | Shore based power plant technician      |
| 216              | 2                  | Electric motors and controls            |
| 220              | 2                  | Electric power and telephone dist. sys. |
| 231              | 1                  | Telephone exchange systems              |
| 234              | 1                  | Inter-office and public address systems |
| 237              | 1                  | Cable splicing                          |
| 240              | 2                  | Interior wiring                         |
| 250              | 1                  | Motor and generator rewinding           |

Source: FRCP Skill Strength Report, GEMS Report  
 No. 1200-002 dated 30 November 1975.



TABLE IX  
CONSTRUCTION ELECTRICIAN SKILLS  
COMPARISON OF SKILL ASSETS VERSUS REQUIREMENTS  
FOR PRCP SKILLS OBTAINABLE AT B-SCHOOL  
 (By Naval Mobile Construction Battalion)

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|               |     |     |     |     |     |     |     |     |     |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Skill No.     | 203 | 212 | 216 | 220 | 231 | 234 | 237 | 240 | 250 |
| Skill Level   | 1   | 2   | 2   | 2   | 1   | 1   | 1   | 2   | 1   |
| NMCB Std Regt | 5   | 8   | 8   | 8   | 8   | 4   | 8   | 5   | 4   |

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|          |    |    |    |    |    |    |    |    |    |
|----------|----|----|----|----|----|----|----|----|----|
| NMCB 1   | 9  | 11 | 28 | 7  | 25 | 18 | 33 | 20 | 16 |
| NMCB 3   | 11 | 10 | 23 | 7  | 26 | 13 | 26 | 8  | 13 |
| NMCB 4   | 3  | 9  | 16 | 8  | 22 | 21 | 25 | 9  | 20 |
| NMCB 5   | 8  | 6  | 6  | 6  | 22 | 21 | 25 | 9  | 16 |
| NMCB 10  | 12 | 2  | 9  | 5  | 12 | 9  | 21 | 11 | 9  |
| NMCB 40  | 5  | 9  | 12 | 7  | 13 | 11 | 23 | 19 | 14 |
| NMCB 62  | 9  | 8  | 9  | 9  | 19 | 17 | 26 | 19 | 15 |
| NMCB 74  | 9  | 14 | 14 | 13 | 20 | 22 | 40 | 15 | 10 |
| NMCB 133 | 13 | 10 | 8  | 6  | 11 | 15 | 22 | 12 | 11 |

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Source: PRCP Skill Strength Report, GEMS Report  
 No. 1200-002 dated 30 November 1975.



b. C-School Requirements based on PRCP

OP-099 determines C-School quotas based on a comparison of projected NEC requirements with the projected NEC inventory. NEC requirements are those listed on approved manpower authorizations. Some NEC requirements listed in the NCF skill requirements directive are not reflected in the CNO approved Manpower Authorizations (OPNAV 1000/2) and are therefore not recognized by CNO (OP-099) and CHNAVPERS as requirements in the C-School process. Table X shows the minimum and target requirements for each NEC according to COMCBPAC/COMCBLANT INST 1500.20. These are compared with the manpower authorization for a standard NMCB to underscore the differences. The Fleet minimum requirement differs from the manpower authorization in 11 of 27 cases. In only one case is the target requirement the same as the manpower authorization. The manpower authorizations should be updated to reflect Fleet requirements, since until this step is taken, the C-School requirement will not be accurately known.

NEC deficiencies are correlated with PRCP deficiencies, however, Ref. 7 specifies training and skill requirements in terms of (1) An absolute minimum number, (2) A target expressed as a percent of on-board strength, and (3) A target expressed as a percent of a standard NMCB allowance. This duplicity may lead to erroneous conclusions as to the actual requirements, particularly by those faced with skill or resource deficiencies. There may be questions as to whether resources should be programmed based on the minimum or target requirements, and that clarification of the training requirement is needed. Elimination of the "target" terminology should make skill requirement quantification and justification much less confusing.



TABLE X  
NAVAL MOBILE CONSTRUCTION BATTALION  
NEC REQUIREMENTS

| <u>NEC</u><br><u>Code</u> | <u>Descriptive Title</u>           | <u>Fleet</u><br><u>Min</u> | <u>Fleet</u><br><u>Tgt</u> | <u>Man-</u><br><u>Pwr</u><br><u>Auth</u> |
|---------------------------|------------------------------------|----------------------------|----------------------------|--|
| 5501                      | Construction Inspector             | 5                          | 12                         | 0  |
| 5502                      | Soils Pavement Analyst             | 2                          | 3                          | 2  |
| 5515                      | Construction Planner and Estimator | 7                          | 14                         | 7  |
| 5632                      | Shore Based Power Plant Tech.      | 3                          | 4                          | 3  |
| 5642                      | Central Office Exchange Tech.      | 2                          | 2                          | 3  |
| 5644                      | Cable Splicing Tech.               | 3                          | 4                          | 3  |
| 5707                      | Water Well Drilling Tech.          | 3                          | 5                          | 3  |
| 5708                      | Blaster                            | 5                          | 7                          | 5  |
| 5709                      | Crushing and Screening Plant Tech. | 3                          | 5                          | 3  |
| 5711                      | Grade Foreman                      | 4                          | 6                          | 2  |
| 5712                      | Asphalt Plant and Paving Tech.     | 4                          | 4                          | 6  |
| 5801                      | Auto Transmission/Hydraulics Mech. | 6                          | 8                          | 6  |
| 5802                      | Masonry Tech.                      | 2                          | 3                          | 2  |
| 5804                      | Stationary Diesel Engine Mech.     | 2                          | 3                          | 0  |
| 5901                      | Concrete Tech.                     | 5                          | 7                          | 5  |
| 5902                      | Masonry Tech.                      | 5                          | 7                          | 5  |
| 5904                      | Millworker                         | 2                          | 3                          | 2  |
| 5906                      | Heavy Const Tech.                  | 7                          | 10                         | 8  |
| 5908                      | Tool and Equipment Tech.           | 2                          | 4                          | 2  |
| 6012                      | Maintenance Welder                 | 2                          | 5                          | 6  |
| 6013                      | Certified Structural Welder        | 0                          | 0                          | 4  |
| 6014                      | Certified Pipe Welder              | 0                          | 0                          | 4  |
| 6017                      | Sheetmetal Tech.                   | 2                          | 3                          | 3  |
| 6021                      | Safety Inspector                   | 1                          | 2                          | 3  |
| 6102                      | Shore Based Boiler Controls Tech.  | 3                          | 4                          | 3  |
| 6014                      | Refrig. and Air Conditioning Tech. | 3                          | 4                          | 3  |
| 6117                      | Petroleum Tank Farm Tech.          | 2                          | 3                          | 2  |

Source: Reference 7 and Chief of Naval Operations  
Manpower Authorization, OPNAV 1000/2, for NMCB 1  
dated 22 October 1975





### c. Scope of Implementation of PRCP

PRCP is presently implemented throughout the active NCF, the Reserve NCF, and is being extended to include the CBU's and CBMU 302. In order to serve as the base for all training and skill management, it should be extended to include all Group VIII personnel and billets.

### d. Funding Considerations

It has been demonstrated in the previous paragraphs that PRCP has utility as a skill inventory and requirements indicator. Adoption of SCBT courses as elements of formal schools is a logical next step in the training system, but some means must be determined to allocate funding responsibility between the participants. An allocation based on the purpose of the training appears most satisfactory. The following breakdown of funding responsibility is recommended:

| <u>Purpose of Training</u> | <u>Funding Responsibility</u> |
|----------------------------|-------------------------------|
| Skill Acquisition          | CNET                          |
| Refresher Training         | Fleets                        |
| Cross Rating Training      | Fleets                        |
| Reserves Training          | Reserves                      |

The annual requirement for skill acquisition training can be determined based on the projected accession and promotion rates. Personnel accession plans would continue to determine the requirement for A-School and funding would be a CNET responsibility. Advanced specialized training (B-School) requirements can be determined based on projected



numbers to be promoted to E-5. All of these personnel should be programmed through training as early as possible in order to amortize the cost of the training over as long a period as possible. C-Schools should continue to be programmed on the basis of the current inventory planning model or be based on PRCP once PRCP is expanded to include all Group VIII personnel and billets. C-School training for approved NEC's is a CNET responsibility. All additional training for the active NCF which is desired for deployment requirements, for cross-rate training, or for special purposes beyond approved levels would become a Fleet responsibility. All training for the Reserves should continue to be funded by the Chief of Naval Reserve. The annual training conference is the logical arena to resolve differences concerning the annual training program and to establish a firm plan.



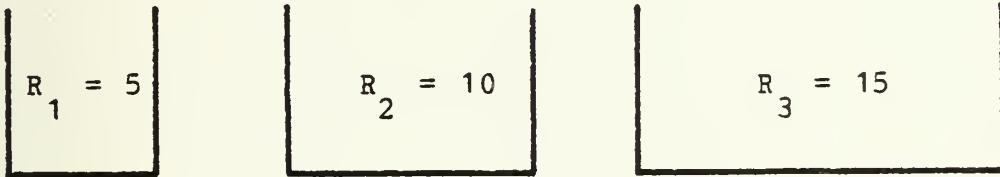
## E. THE TRAINING REQUIREMENTS MODEL

One of the assumptions which is basic to the process of managing the training program of the NCF is that maximum use will be made of the training resources available. One possible area of improvement is the method in which training billets are allocated. The various means used to allocate school billets have previously been discussed. Briefly the allocation is made on rules of thumb based on on-board levels in certain ratings, on anticipated input levels, or on NEC shortages. Fleet schools, particularly SCBT courses, tend to be scheduled based on PRCP deficiencies or individual circumstances of NMCB's returning to homeport. All of these allocation methods are satisfactory if there are sufficient training resources to meet all of the deficiencies. If, however, decisions must be made to allocate resources between competing objectives, some procedure must be developed to take care of the most pressing needs first. In order to simplify the presentation of the model proposed to serve this purpose, a procedure for allocating the B-School billets between the Group VIII Ratings will be presented. The procedure is applicable to other situations involving allocation of billets of any of the formal or Fleet schools between ratings, individuals, or commands.



# 1. A Simple Distribution Problem

Consider the problem represented below with three containers of unequal size. The volumes represented are:  $R_1 = 5$ ,  $R_2 = 10$ ,  $R_3 = 15$ . It is desired to distribute 12 units to the three containers so that each receives a proportionate share.



The total capacity of all three containers is  $R_1 + R_2 + R_3 = 30$ . The 12 added units should be distributed between the containers as follows:

| <u>Container</u> | <u>Proportionate Share</u> |
|------------------|----------------------------|
| 1                | $5/30 \times 12 = 2$       |
| 2                | $10/30 \times 12 = 4$      |
| 3                | $15/30 \times 12 = 6$      |

Now suppose that the containers are initially partially filled, and it is desired to add the 12 units to the three containers such that all will end up equally full. If the containers initially contain material, that is, if there is a beginning inventory (BI) of:  $BI_1 = 1$ ,  $BI_2 = 4$  and  $BI_3 = 3$ , and 12 is to be added to the inventory, the





inventory will total 20. The distribution between  
containers is as follows:



| <u>Vcl</u> | <u>Share</u>       | <u>B.I.</u> | <u>Amt to Add</u> |
|------------|--------------------|-------------|-------------------|
| 1          | 5/30 x 20 = 3.33   | -1          | 2.33              |
| 2          | 10/30 x 20 = 6.67  | -4          | 2.67              |
| 3          | 15/30 x 20 = 10.00 | -3          | 7.00              |

## 2. A General Model

The problem of distributing training quotas to seven SEABEE ratings of equal importance but of different sizes is very similar to the simple distribution problem just presented. In the B-School problem, the planner is trying to achieve a situation where all ratings conclude the training process with the same percentage of B-School trained personnel in the inventory. Stated another way, it is desired to distribute a scarce resource, (B-School graduates in the ending inventory), according to the equation

$$(Eq. 1) \quad EI_i = P_i (BI + S), \quad (i = EA, CE, \dots, UT),$$

where  $EI_i$  is the number of B-School graduates in the ending inventory of rating  $i$ ,  $P_i$  is the proportionate size of rating  $i$ ,  $BI$  is the total beginning inventory of all ratings and  $S$  is the total number trained during the period.

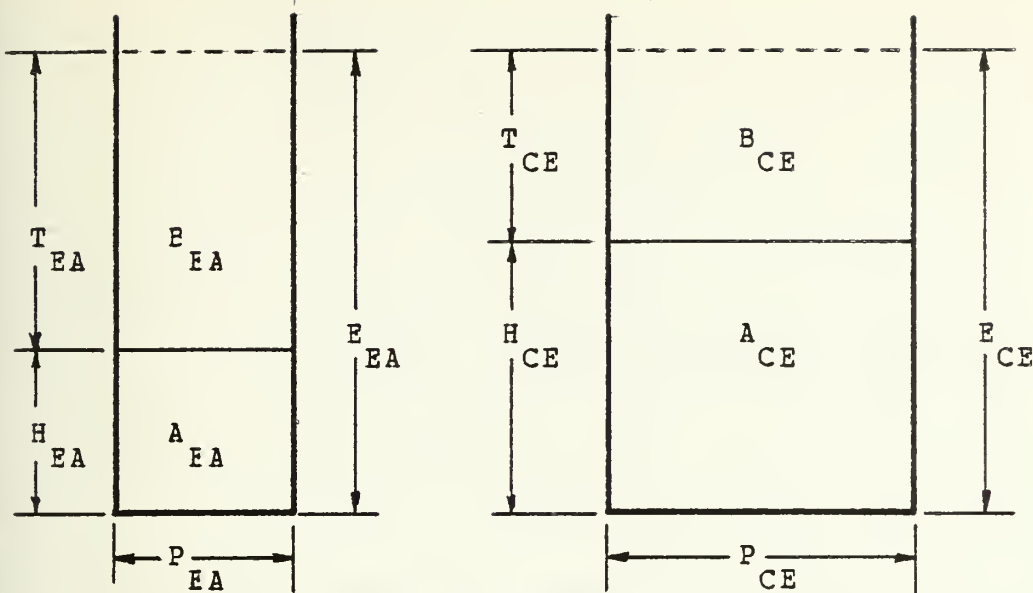
## 3. A Linear Programming Model

Linear Programming is a ~~Linear Programming is a~~ mathematical technique designed to assist in solutions to problems involving the maximizing or minimizing of functional relationships reduced to linear equations. The problem for which linear programming provides a solution may



be stated as follows: Maximize (or minimize) some dependent variable which is a function of several independent variables when the independent variables are subjected to various constraints [Ref. 23]. The B-School planning problem can be represented as shown, utilizing the container analogy explained above. Only two ratings are represented for illustrative purposes:





$P_i$  = Number of E-5 and E-6 in rating (i)

$A_i$  = Initial inventory of graduates in rating (i)

$B_i$  = Number to be trained during the period in rating (i)

$H_i$  = Initial percent trained personnel in rating (i)

$T_i$  = Increase in percent of rating (i) with B-School

SEATS = Total no. to be trained in B-School, all Ratings

$E_i$  = Percent of trained personnel, ending inventory

$i$  = EA, CE, EO, CM, BU, SW, UT

The objective is to obtain the highest percentage of B-School graduates in each rating, that is, to maximize  $E$  where  $E \leq E_i$ ,  $i$  = EA, CE, EO, CM, BU, SW, UT. Values for

$P_i$ ,  $A_i$ ,  $H_i$ , and SEATS will normally be known. The problem is therefore presented in a manner suitable for solution through linear programming procedures. The equations are presented below:





(EQ. 2)

MAXIMIZE: E

SUBJECT TO:

$$E = E_i, \quad (i = EO, CE, \dots, UT)$$

$$T_i + H_i - E_i \geq 0$$

$$B_i - P_i T_i = 0$$

$$\sum B_i = \text{SEATS}, \quad (\text{SEATS is known})$$

$$B_i, T_i, H_i, A_i, P_i, E_i \geq 0$$

All then that is needed to solve the linear programming problem presented is data on the independent variables P, A, and H for each of the ratings, and a projection of the total B-School billet availability. Table XI provides the data which was used to generate the computer solution presented in Table XII.



TABLE XI  
PROJECTED B SCHOOL INPUT  
FISCAL YEAR 1976

| <u>Rating</u> | <u>NCTC P.H.</u> | <u>NCTC, Gulfport</u> | <u>Total</u> |
|---------------|------------------|-----------------------|--------------|
| SW            | 17               | 16                    | 33           |
| UI            | 19               | 19                    | 38           |
| CE            | 22               | 23                    | 55           |
| CM            | 29               | 29                    | 58           |
| EO            | 40               | 40                    | 80           |
| EA            | 8                | 8                     | 16           |
| BU            | 38               | 32                    | 70           |
| Total         | 173              | 167                   | 340          |

VALUES OF P, A, AND H  
DERIVED FROM FY 1975 DATA  
GROUP VIII RATINGS

| <u>Rating</u> | <u>P</u> | <u>A</u> | <u>H</u> |
|---------------|----------|----------|----------|
| EA            | 1.54     | 28       | 18.18    |
| CE            | 6.45     | 146      | 22.64    |
| EC            | 8.11     | 365      | 45.01    |
| CM            | 6.28     | 191      | 30.41    |
| EU            | 10.33    | 270      | 26.14    |
| SW            | 3.26     | 83       | 25.46    |
| UT            | 5.62     | 148      | 26.33    |

Source: Reference 25



TABLE XII  
LINEAR PROGRAMMING PRINTOUT  
(SEATS FIXED, DETERMINE ALLOCATION)

| <u>No.</u> | <u>Column</u> | <u>At</u> | <u>Activity</u> | <u>Input<br/>Cost</u> | <u>Lower<br/>Limit</u> | <u>Upper<br/>Limit</u> | <u>Reduced<br/>Cost</u> |
|------------|---------------|-----------|-----------------|-----------------------|------------------------|------------------------|-------------------------|
| 25         | F             | BS        | 36.0205         | 1.0                   | .                      | NONE                   | .                       |
| 26         | SEATS         | BS        | 340.0000        | .                     | .                      | NONE                   | .                       |
| 27         | PEA           | BS        | 27.4744         | .                     | .                      | NONE                   | .                       |
| 28         | PCF           | BS        | 86.3045         | .                     | .                      | NONE                   | .                       |
| 29         | BEC           | BS        | .               | .                     | .                      | NONE                   | .                       |
| 30         | PCM           | BS        | 35.2342         | .                     | .                      | NONE                   | .                       |
| 31         | BBU           | BS        | 102.0660        | .                     | .                      | NONE                   | .                       |
| 32         | ESW           | BS        | 34.4599         | .                     | .                      | NONE                   | .                       |
| 33         | BUT           | BS        | 54.4608         | .                     | .                      | NONE                   | .                       |
| 34         | TEA           | BS        | 17.8405         | .                     | .                      | NONE                   | .                       |
| 35         | TCE           | BS        | 13.3805         | .                     | .                      | NONE                   | .                       |
| 36         | TEO           | LL        | .               | .                     | .                      | NONE                   | .242-                   |
| 37         | TCM           | BS        | 5.6105          | .                     | .                      | NONE                   | .                       |
| 38         | TEU           | BS        | 9.8805          | .                     | .                      | NONE                   | .                       |
| 39         | TSW           | BS        | 10.5705         | .                     | .                      | NONE                   | .                       |
| 40         | TUT           | BS        | 9.6905          | .                     | .                      | NONE                   | .                       |
| 41         | EEA           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |
| 42         | ECF           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |
| 43         | EEC           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |
| 44         | ECM           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |
| 45         | FBU           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |
| 46         | ESW           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |
| 47         | EUT           | BS        | 36.0205         | .                     | .                      | NONE                   | .                       |

Source: Extracted from output generated by  
IBM 360 utilizing linear programming package  
MPS/360 V2-M10.



#### 4. Variations in the Model

With only minor variations, the model developed in the previous section can be extended to provide the total number of seats, (quotas), which should be provided when the overall percentage of B-School graduates desired in all ratings is known. The problem can be translated to a linear programming format as follows:

MINIMIZE: SEATS

SUBJECT TO:

$$E_i = E, \text{ (E is known)}$$

$$\sum B_i = \text{SEATS}$$

$$B_i = P_i T_i$$

$$T_i + H_i - E_i \geq 0$$

$$B_i, T_i, H_i, A_i, P_i, E_i \geq 0$$

The solution to this problem, utilizing the data presented in previous sections is included as Table XIII.

Further variations and refinements to the model may be developed for specific uses. Additional constraints such as classroom size, instructor availability, optimum class size, specific training requirements in excess of normal, can be handled by this procedure. The model developed will become more complicated as additional constraints are imposed.





TABLE XIII  
LINEAR PROGRAMMING PRINTOUT  
(PERCENT ATTAINMENT FIXED, FIND SEATS REQUIRED)

| <u>No.</u> | <u>Column</u> | <u>At</u> | <u>Activity</u> | <u>Input<br/>Cost</u> | <u>Lower<br/>Limit</u> | <u>Upper<br/>Limit</u> | <u>Reduced<br/>Cost</u> |
|------------|---------------|-----------|-----------------|-----------------------|------------------------|------------------------|-------------------------|
| 25         | F             | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 26         | SEATS         | BS        | 848.5011        | 1.0                   | .                      | NONE                   | .                       |
| 27         | BEA           | BS        | 49.0028         | .                     | .                      | NONE                   | .                       |
| 28         | BCE           | BS        | 176.4720        | .                     | .                      | NONE                   | .                       |
| 29         | BEC           | BS        | 40.4689         | .                     | .                      | NONE                   | .                       |
| 30         | BCM           | BS        | 123.0252        | .                     | .                      | NONE                   | .                       |
| 31         | BEU           | BS        | 246.4738        | .                     | .                      | NONE                   | .                       |
| 32         | BSW           | BS        | 80.0330         | .                     | .                      | NONE                   | .                       |
| 33         | BUT           | BS        | 133.0254        | .                     | .                      | NONE                   | .                       |
| 34         | TEA           | BS        | 31.8200         | .                     | .                      | NONE                   | .                       |
| 35         | TCE           | BS        | 27.3600         | .                     | .                      | NONE                   | .                       |
| 36         | TEC           | BS        | 4.9900          | .                     | .                      | NONE                   | .                       |
| 37         | TCM           | BS        | 19.5900         | .                     | .                      | NONE                   | .                       |
| 38         | TEU           | BS        | 23.8600         | .                     | .                      | NONE                   | .                       |
| 39         | TSW           | BS        | 24.5500         | .                     | .                      | NONE                   | .                       |
| 40         | TUT           | BS        | 23.6700         | .                     | .                      | NONE                   | .                       |
| 41         | EEA           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 42         | ECE           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 43         | EEC           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 44         | ECM           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 45         | EBU           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 46         | ESW           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |
| 47         | EUT           | BS        | 50.0000         | .                     | .                      | NONE                   | .                       |

Source: Extracted from output generated by  
IBM 360 utilizing linear programming package  
MPS/360 V2-M10.



#### IV. RECOMMENDATIONS AND CONCLUSIONS

##### A. GENERAL CONCLUSIONS

The Group VIII community should be brought under a single management control system. PRCP appears to have the potential to serve the information needs of the system, with SCBT courses acting as the training elements. This action should assist in providing a more efficient training Program without sacrifice of quality.

Adoption of a one-station training concept should eliminate some of the waiting and travel time experienced by personnel during the critical first year in the Navy. This concept appears to deserve additional analysis to determine its feasibility in the present day environment.

##### B. SPECIFIC RECOMMENDATIONS

###### 1. Transfer SCBT Courses to CNET

The SCBT courses are derived directly from, and are elements of Class A and B-Schools. These short courses have been developed locally by NCTC's and homeport NCR's with little formal recognition by the CNET system. It is recommended that CNET conduct a review of the SCBT Courses as currently offered, and that CNET assume all



responsibility for the conduct of SCBT courses. It is further recommended that SCBT courses be developed for the material promulgated in the C-Schools.

## 2. Expand PRCP

It is recommended that PRCP be expanded to cover the entire Group VIII rating structure, including billets and personnel both in and out of the NCF. It is further recommended that PRCP data collection be expanded to include information on SCBT and formal schools attended by all Group VIII personnel. Full implementation of this recommendation will enable PRCP to serve as a basis for projecting training requirements, and for establishing a validation procedure to reduce the time individuals must spend in the formal schools.

## 3. Credit SCBT Courses Completed

Adopting a procedure to allow credit for SCBT courses taken, combined with the expanded inventory procedure recommended above will provide a basis for the validating of course material in the formal school system, and serve to prevent duplicate training. It is further recommended that appropriate PRCP skills be awarded as soon as a formal or SCBT course is completed. In the event an individual demonstrates that he does not possess the skill after having completed the SCBT course, the skill could be removed from his PRCP transcript.

## 4. Fleets update Skill Requirements

NEC's reflected in the Fleet NCF skill/training



instruction [Ref. 7] should be included in the manpower authorization documents for all NCF Units. The skills required by a unit should be expressed as a finite requirement, not as a "minimum " or "target" as is presently the case. The requirements for all NCF units, including command staffs, regiments, battalions and teams should be developed.

## 5. Utilize Linear Programming Models

Utilization of the linear programming models developed in this paper, or of more complex models based on this concept, should assist managers in allocating training billets among the individuals or commands desiring the training. The goal in this procedure is determining what courses to present, and who will attend them, so that the optimum use of the training dollar can be obtained.





# APPENDIX A

## SPECIAL SEABEE TRAINING COURSES

(Page 1 of 7)

### BUILDER

| <u>Course<br/>No.</u> | <u>Title</u>  | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|-----------------------|---|---------------------------|-------------------------------------|
| BU-1                  | Blueprint Reading and Building Laycut                       | 1                         | 1                                   |
| BU-2                  | Woodworking and Millwork                                    | 1                         | 1                                   |
| BU-3                  | Light Frame Construction (Basic)                            | 2                         | 1                                   |
| BU-4                  | Roofing, Painting, Glazing, and Composition Tile (Basic)    | 1                         | 1                                   |
| BU-5                  | Masonry Construction (Basic)                                | 1                         | 1                                   |
| BU-6                  | Concrete Construction (Basic)                               | 2                         | 1                                   |
| BU-7                  | Field and Waterfront Structures                             | 1                         | 1                                   |
| BU-10                 | Concrete Construction                                       | 2                         | 2                                   |
| BU-11                 | Shop Machinery  | 2                         | 2                                   |
| BU-12                 | Light Frame Construction (Advanced)                         | 2                         | 2                                   |
| BU-13                 | Roofing, Painting, Glazing, and Composition Tile (Advanced) | 1                         | 2                                   |
| BU-14                 | Masonry Construction  | 1                         | 2                                   |
| BU-15                 | Plastering and Ceramic Tile                                 | 1                         | 2                                   |
| BU-16                 | Advanced Base and Waterfront Structures                     | 2                         | 2                                   |
| BU-17                 | Foremanship   | 1                         | 2                                   |
| BU-18                 | Project Planning  | 2                         | 2                                   |

Source: Reference 12



APPENDIX A  
SPECIAL SEABEE TRAINING COURSES  
(Page 2 of 7)  
STEELWORKER

| <u>Course<br/>No.</u> | <u>Title</u>                                 | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|-----------------------|--|---------------------------|-------------------------------------|
| SW-1                  | Mathematics, Blueprint reading and Sketching | 1                         | 1                                   |
| SW-2                  | Sheetmetal Layout and Shop                   | 2                         | 1                                   |
| SW-3                  | Metal Working and Gas Cutting                | 1                         | 1                                   |
| SW-4                  | Gas Cutting                                  | 1                         | 1                                   |
| SW-5                  | Arc Welding                                  | 2                         | 1                                   |
| SW-6                  | Basic Fiber Line                             | 1                         | 1                                   |
| SW-7                  | Basic Wire Rope                              | 1                         | 1                                   |
| SW-8                  | Steel Erection                               | 2                         | 1                                   |
| SW-10                 | Advanced Sheetmetal Layout                   | 2                         | 2                                   |
| SW-11                 | Advanced Gas Welding                         | 1                         | 2                                   |
| SW-12                 | Advanced Arc Welding                         | 2                         | 2                                   |
| SW-13                 | Pipe Layout and Welding                      | 2                         | 2                                   |
| SW-14                 | MIG Welding Aluminum and Steel               | 2                         | 2                                   |
| SW-15                 | TIG Welding Aluminum and Stainless Steel     | 2                         | 2                                   |
| SW-16                 | Maintenance Welding Techniques               | 2                         | 2                                   |
| SW-17                 | Advanced Fiber Line                          | 1                         | 2                                   |
| SW-18                 | Advanced Wire Rope                           | 2                         | 2                                   |
| SW-19                 | Planning and Estimating                      | 2                         | 2                                   |

Source: Reference 12



APPENDIX A  
SPECIAL SEABEE TRAINING COURSES  
(Page 3 of 7)  
EQUIPMENT OPERATOR

| <u>Course<br/>No.</u> | <u>Title</u>                             | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|-----------------------|--|---------------------------|-------------------------------------|
| EO-1                  | Automatic Vehicles                       | 2                         | 1                                   |
| EO-2                  | Front-end Loaders and Forklifts          | 1                         | 1                                   |
| EO-3                  | Gradework                                | 1/2                       | 1                                   |
| EO-4                  | Motor Graders                            | 1                         | 1                                   |
| EO-5                  | Crawler Tractors                         | 2                         | 1                                   |
| EO-6                  | Scrapers                                 | 2                         | 1                                   |
| EO-10                 | Gradework and Planning and<br>Estimating | 1                         | 2                                   |
| EO-11                 | Dozers and Scrapers                      | 3                         | 2                                   |
| EO-12                 | Cranes and Attachments                   | 4                         | 2                                   |
| EO-13                 | Asphalt Paving Construction              | 4                         | 2                                   |
| EO-14                 | Rock Crushing Operation                  | 2                         | 2                                   |
| EO-15                 | Trenching Equipment Operation            | 1                         | 2                                   |

Source: Reference 12



APPENDIX A  
SPECIAL SEABEE TRAINING COURSES  
(Page 4 of 7)  
CONSTRUCTION MECHANIC

| <u>Course<br/>No.</u> | <u>Title</u>  | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|-----------------------|---|---------------------------|-------------------------------------|
| CM-1                  | Autcmotive Electricity                              | 1                         | 1                                   |
| CM-2                  | Equipment Work Order                                | 1 da                      | 1                                   |
| CM-3                  | Internal Combustion Engines                         | 2                         | 1                                   |
| CM-4                  | Tactical Vehicle Maintenance                        | 2                         | 1                                   |
| CM-5                  | Fluid Power and Parker Hose Assembly                | 1                         | 1                                   |
| CM-6                  | Air Compressors and Pneumatic Tools                 | 1                         | 1                                   |
| CM-7                  | International TD 20 Series "B"<br>Crawler Tractor   | 1                         | 1                                   |
| CM-8                  | Gallicn Model 118T Motor Grader                     | 1                         | 1                                   |
| CM-9                  | Pettibone Model OSS-3354.RT 6000<br>Forklift        | 1                         | 1                                   |
| CM-10                 | Engine Analysis (Engine Electrical<br>System)       | 2                         | 2                                   |
| CM-11                 | GM Series "71" Diesel Engine                        | 1                         | 2                                   |
| CM-12                 | Multifuel Engine Model LD-465-1                     | 1                         | 2                                   |
| CM-13                 | Roosa Master Fuel Injection System                  | 1                         | 2                                   |
| CM-14                 | MRS I-110 Diesel Wheel Tractor                      | 1                         | 2                                   |
| CM-15                 | Euclid Model TS 24 Scraper                          | 1                         | 2                                   |
| CM-16                 | Construction Equipment Power-shift<br>Transmissions | 2                         | 2                                   |

Source: Reference 12





APPENDIX A  
SPECIAL SEABEE TRAINING COURSES  
(Page 5 of 7)  
CONSTRUCTION ELECTRICIAN

| <u>Course<br/>No.</u> | <u>Title</u>  | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|-----------------------|---|---------------------------|-------------------------------------|
| CE-1                  | Mathematics and Electricity                         | 2                         | 1                                   |
| CE-2                  | Motors and Generators                               | 2                         | 1                                   |
| CE-3                  | Communications                                      | 2                         | 1                                   |
| CE-4                  | Interior Wiring                                     | 2                         | 1                                   |
| CE-5                  | Power Distribution                                  | 2                         | 1                                   |
| CE-10                 | Applied Mathematics                                 | 1                         | 2                                   |
| CE-11                 | Electrical Theory                                   | 2                         | 2                                   |
| CE-12                 | Power Distribution                                  | 2                         | 2                                   |
| CE-13                 | Interior Wiring                                     | 2                         | 2                                   |
| CE-14                 | Communications                                      | 2                         | 2                                   |
| CE-15                 | Electrical Power Plant Operation and<br>Maintenance | 2                         | 2                                   |
| CE-16                 | Alternating Current Motors                          | 2                         | 2                                   |

Source: Reference 12



APPENDIX A  
SPECIAL SEABEE TRAINING COURSES  
(Page 6 of 7)  
UTILITIESMAN

| <u>Course<br/>No.</u> | <u>Title</u>  | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|-----------------------|---|---------------------------|-------------------------------------|
| UT-1                  | Basic Plumbing  | 2                         | 1                                   |
| UT-2                  | Plumbing Cast Iron Soil Pipe                                    | 2                         | 1                                   |
| UT-3                  | Finish Plumbing and Pipe Insulation                             | 1                         | 1                                   |
| UT-4                  | Pumps and Compressors   | 1                         | 1                                   |
| UT-5                  | Water Treatment and Sewage and<br>Refuse Disposal               | 2                         | 1                                   |
| UT-6                  | Refrigeration   | 2                         | 1                                   |
| UT-7                  | Boilers   | 2                         | 1                                   |
| UT-10                 | Foremanship and Mathematics                                     | 1                         | 2                                   |
| UT-11                 | Designing Isometric Drawings and<br>Computing Material Take-off | 1                         | 2                                   |
| UT-12                 | Isometric Drawings, Material<br>Take-off and Critical Path      | 1                         | 2                                   |
| UT-13                 | Sewage and Refuse Disposal                                      | 1                         | 2                                   |
| UT-14                 | Internal Combustion Engines and Pump<br>Repair                  | 1                         | 2                                   |
| UT-15                 | Water Purification and Distillation                             | 2                         | 2                                   |
| UT-16                 | Boilers and Related Systems                                     | 1                         | 2                                   |
| UT-17                 | Boiler Maintenance and Repair                                   | 2                         | 2                                   |
| UT-18                 | Refrigeration   | 2                         | 2                                   |
| UT-19                 | Air Conditioning  | 2                         | 2                                   |

Source: Reference 12



APPENDIX A  
SPECIAL SEABEE TRAINING COURSES  
(Page 7 of 7)  
ENGINEERING AID

| Course<br><u>No.</u> | <u>Title</u>              | <u>Length<br/>(Weeks)</u> | <u>Skill<br/>Level<br/>Attained</u> |
|----------------------|---------------------------|---------------------------|-------------------------------------|
| EA-1                 | Materials Quality Control | 1                         | 1                                   |
| EA-2                 | Basic Drafting            | 2                         | 1                                   |
| EA-3                 | Construction Drafting     | 3                         | 1                                   |
| EA-4                 | Basic Surveying           | 1                         | 1                                   |
| EA-5                 | Surveying Instruments     | 1                         | 1                                   |
| EA-6                 | Topographic Surveying     | 2                         | 1                                   |
| EA-7                 | Engineering Surveys       | 2                         | 1                                   |

Source: Reference 12



# APPENDIX B

## SKILL REQUIREMENTS FOR NMCB'S

(Page 1 of 7)

### BUILDER

| <u>Skill Title</u>                         | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|--|--------------------------------------|--------------------------------------|--------------------------------------|
| 103 Planning and Estimating                | 12/17                                | 3b/5b                                | -                                    |
| 108 Tool and Equipment Maint.              | 2a/4a                                | -                                    | -                                    |
| 110 Woodworking and Millworking            | 22/30                                | 2c/4c                                | -                                    |
| 130 Concrete Forming and<br>Reinforcing    | 36/47                                | 21/28                                | 5d/7d                                |
| 132 Mixing, Placing, Finishing<br>Concrete | 36/47                                | 21/28                                | 5d/7d                                |
| 140 Masonry Unit Construction              | 36/47                                | 21/28                                | 5e/7e                                |
| 150 Light Frame Construction               | 42/56                                | 20/26                                | -                                    |
| 162 Roofing                                | 9/12                                 | -                                    | -                                    |
| 164 Finish Carpentry                       | 20/26                                | 9/12                                 | -                                    |
| 166 Plastering                             | 24/31                                | 5e/7e                                | -                                    |
| 167 Ceramic Tile Setting                   | 5e/7e                                | -                                    | -                                    |
| 170 Heavy Construction                     | 34/45                                | 21/27                                | 7f/10f                               |
| 190 Painting and Preservation              | 33/44                                | 20/26                                | 2/5                                  |
| 198 Glazing                                | 20/26                                | 9/12                                 | -                                    |

### FOOTNOTES:

- a - NEC BU-5908, Tool and Equipment Technician
- b - NEC BU-5515, Planner and Estimator
- c - NEC BU-5904, Millworker
- d - NEC BU-5901, Concrete Technician
- e - NEC BU-5902, Masonry Technician
- f - NEC BU-5906, Heavy Construction Technician





APPENDIX B  
SKILL REQUIREMENTS FOR NMCB'S  
(Page 2 of 7)  
CONSTRUCTION ELECTRICIAN

| <u>Skill Title</u>                                 | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|--|--------------------------------------|--------------------------------------|--------------------------------------|
| 203 Planning and Estimating                        | 4/5                                  | 1a/2a                                | -                                    |
| 212 Shore Based Power Plant<br>Technician          | 11/14                                | 6/8                                  | 3b/4b                                |
| 216 Electric Motors and Controls                   | 11/14                                | 6/8                                  | 2/3                                  |
| 220 Electric Power Distribution<br>Systems         | 15/19                                | 6/8                                  | 3/4                                  |
| 231 Telephone Exchange and<br>Distribution Systems | 6/8                                  | -                                    | -                                    |
| 234 Inter-office and Public<br>Address systems     | 3/4                                  | -                                    | -                                    |
| 237 Cable Splicing                                 | 6/8                                  | 3c/4c                                | -                                    |
| 240 Interior Wiring                                | 20/26                                | 4/5                                  | -                                    |
| 250 Motor and Generator Rewinding                  | 3/4                                  | -                                    | -                                    |

FCCTNOTES:

- a - NEC EA-5515 Planner and Estimator
- b - NEC CE-5632 Shore Based Power Plant Technician
- c - NEC CE-5644 Cable Splicing Technician



APPENDIX B  
SKILL REQUIREMENTS FOR NMCB'S  
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CONSTRUCTION MECHANIC

| <u>Skill Title</u>            | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|-------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 325 Engine Cverhaul           | 11/14                                | 6/8                                  | 3/4                                  |
| 332 Engine Tune-up (Gasoline) | 11/14                                | 6/8                                  | 3/4                                  |
| 334 Engine Tune-up (Diesel)   | 11/14                                | 6/8                                  | 3/4                                  |
| 345 Equipment Electrical      | 11/14                                | 6/8                                  | 2a/3a                                |
| 355 Equipment Power Train     | 9/10                                 | 6/8                                  | 6b/8b                                |
| 365 Equipment Chassis         | 11/14                                | 6/8                                  | 3/4                                  |

FOOTNOTES:

- a - NEC CM-5802, Automotive Electrical Technician
- b - NEC CM-5801, Automatic Transmissions/Hydraulic Systems Mechanic



APPENDIX B  
SKILL REQUIREMENTS FOR NMCE'S  
(Page 4 of 7)  
ENGINEERING AID

| <u>Skill Title</u>          | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|-----------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 400 Applied Engineering     |                                      |                                      |                                      |
| 403 Planning and Estimating | 3/4                                  | 1a/2a                                | -                                    |
| 410 Surveying               | 5/6                                  | 1/2                                  | -                                    |
| 420 Drafting .              | 5/6                                  | 1/2                                  | -                                    |
| 440 Materials Testing       | 4/5                                  | 2b/3b                                | -                                    |

FCCTNOTES:

- a - NEC EA-5515, Planner and Estimator
- b - NEC EA-5502, Soils and Pavement Analysis



APPENDIX B  
SKILL REQUIREMENTS FOR NMCE'S  
(Page 5 of 7)  
EQUIPMENT OPERATOR

| <u>Skill Title</u>                        | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|---|--------------------------------------|--------------------------------------|--------------------------------------|
| 515 Tractor and Trailer Operation         | 33/44                                | 8/10                                 | -                                    |
| 521 Asphalt Paving and Plant<br>Operation | 13/17                                | 4a/6a                                | -                                    |
| 521 Asphalt Distributor Operation         | 5/7                                  | -                                    | -                                    |
| 523 Crushing and Screening<br>Operations  | 3b/5b                                | -                                    | -                                    |
| 526 Soil Stabilization                    | 6/17                                 | 4c/6c                                | -                                    |
| 530 Water Well Drilling                   | 3d/5d                                | -                                    | -                                    |
| 532 Power Earth Auger                     | 5/7                                  | -                                    | -                                    |
| 536 Rock Drill Operation -                | 5/7                                  | -                                    | -                                    |
| 540 Crane and Attachments                 | 10/13                                | 7/9                                  | 1/2                                  |
| 542 Scraper Operation                     | 26/34                                | 10/15                                | -                                    |
| 544 Grader Operation                      | 10/13                                | 7/9                                  | 1/2                                  |
| 546 Crawler Tractor and<br>Attachments    | 33/44                                | 8/10                                 | -                                    |
| 548 Ditcher Operation                     | 13/17                                | 5/7                                  | -                                    |
| 549 Front-end Loader and<br>Attachments   | 33/44                                | 8/10                                 | -                                    |
| 585 Blasting and Quarry Operations        | 5e/7e                                | -                                    | -                                    |

FOOTNOTES:

- a - NEC EO-5712, Asphalt Paving and Plant Operating Technician
- b - NEC EC-5709, Crushing and Screening Plant Technician
- c - NEC EO-5711, Grade Foreman
- d - NEC EO-5707, Water Well Drilling
- e - NEC EO-5708, Blaster





APPENDIX B  
SKILL REQUIREMENTS FOR NMCB'S  
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STEELWORKER

| <u>Skill Title</u>           | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 603 Planning and Estimating  | 3/4                                  | 1c/2c                                | -                                    |
| 610 Arc Welding (Structural) | 16/22                                | 6/8                                  | 3d*/4d*                              |
| 612 Arc Welding (Pipe)       | 5/7                                  | 3e*/4e*                              | -                                    |
| 615 Gas Cutting and Welding  | 16/22                                | 6/8                                  | -                                    |
| 618 Inert-Gas Arc Welding    | 5/7                                  | 2*/3*                                | -                                    |
| 619 Maintenance Welding      | 4b/6b                                | -                                    | -                                    |
| 620 Sheetmetal Work          | 5/7                                  | 2a/3a                                | -                                    |
| 630 Steel Reinforcing        | 13/18                                | 2/3                                  | -                                    |
| 634 Rigging                  | 5/7                                  | 2/3                                  | -                                    |
| 635 Steel Erection           | 13/18                                | 2/3                                  | -                                    |

FOOTNOTES:

- \* - Certified Welding, requires annual re-certification
- a - NEC SW-6017, Sheetmetal Technician
- b - NEC SW6012, Maintenance Welder
- c - NEC EA-5515, Planner and Estimator
- d - NEC SW-6013, Certified Structural Welder
- e - NEC SW-6014, Certified Pipe Welder



APPENDIX B  
SKILL REQUIREMENTS FOR NMCB'S  
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UTILITIESMAN

| <u>Skill Title</u>                          | <u>Skill<br/>Level-1<br/>Min/Tgt</u> | <u>Skill<br/>Level-2<br/>Min/Tgt</u> | <u>Skill<br/>Level-3<br/>Min/Tgt</u> |
|---|--------------------------------------|--------------------------------------|--------------------------------------|
| 703 Planning and Estimating                 | 3/5                                  | 1a/2a                                | -                                    |
| 710 Plumbing                                | 16/21                                | 6/8                                  | -                                    |
| 720 Shore Based Boilers                     | 6/8                                  | 2/3                                  | 3b/4b                                |
| 730 Pumps and Compressors                   | 12/15                                | 4/6                                  | -                                    |
| 740 Water Treatment                         | 6/8                                  | 2/3                                  | 2/3                                  |
| 750 Sewage Disposal and Field<br>Sanitation | 6/8                                  | 2/3                                  | -                                    |
| 760 Air Conditioning and<br>Refrigeration   | 6/8                                  | 3c/4c                                | -                                    |
| 770 Petroleum Handling and Storage          | 2d/3d                                | -                                    | -                                    |

FOOTNOTES:

- a - NEC EA-5515, Planner and Estimator
- b - NEC UT-6102, Shore Based Boiler Controls Technician
- c - NEC MM-4294, Refrigeration and Air Conditioning Mechanic
- d - NEC UT-6117, Petroleum Tank Farm Technician



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Naval Construction Battalion Center  
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